PGH BRICKS & PAVERS™

Avante
A brick walling system

Technical Manual

CSR

TABLE OF CONTENTS

Avante
A brick walling system

01 INTRODUCTION

01 INTRODUCTION

Avante from PGH Bricks & Pavers (PGH) is a ventilated rainscreen façade system designed to permit the use of brick in a variety of situations where the look of brick is desired but traditional brick construction is not economical.

The Avante system is comprised of thin brick facings specially cut from PGH's traditional range of bricks and mechanically fixed into a unique steel backing section. The Avante system is fixed onto a vertical support system, incorporating a cavity for ventilation and weep holes for drainage. Directly fixing the Avante system to a substrate can be used on internal applications only, PGH does not recommend direct fix installation for external areas.

Mortar is added to the surface joints using purpose designed tools.

Via utilising PGH's traditional range of bricks, the Avante system can look and feel identical to traditional brickwork but offers more design flexibility and a thinner, lighter facade, removing the need for load carrying steel components (such as shelf angles and lintels) and limitations on the height of the wall. The Avante system can also integrate seamlessly with traditional brickwork and is ideal for restorations.

Avante can be used with a wide range of substructures, including concrete, timber frame, lightweight steel frames, masonry, etc. This, along with the large and exciting range of colours and textures available provides limitless possibilities when using this unique building material.

Avante meets the necessary requirements of the National Construction Code (NCC), is durable, weather resistant, non-combustible and structurally sound for its intended applications, being residential medium density buildings and fit outs.

This Technical Manual recommends good building practice methodology and has been prepared as a general guide of design considerations, system engineering information and installation procedures for common installations of the Avante system. It assumes that the user has an adequate knowledge level of building design and construction.

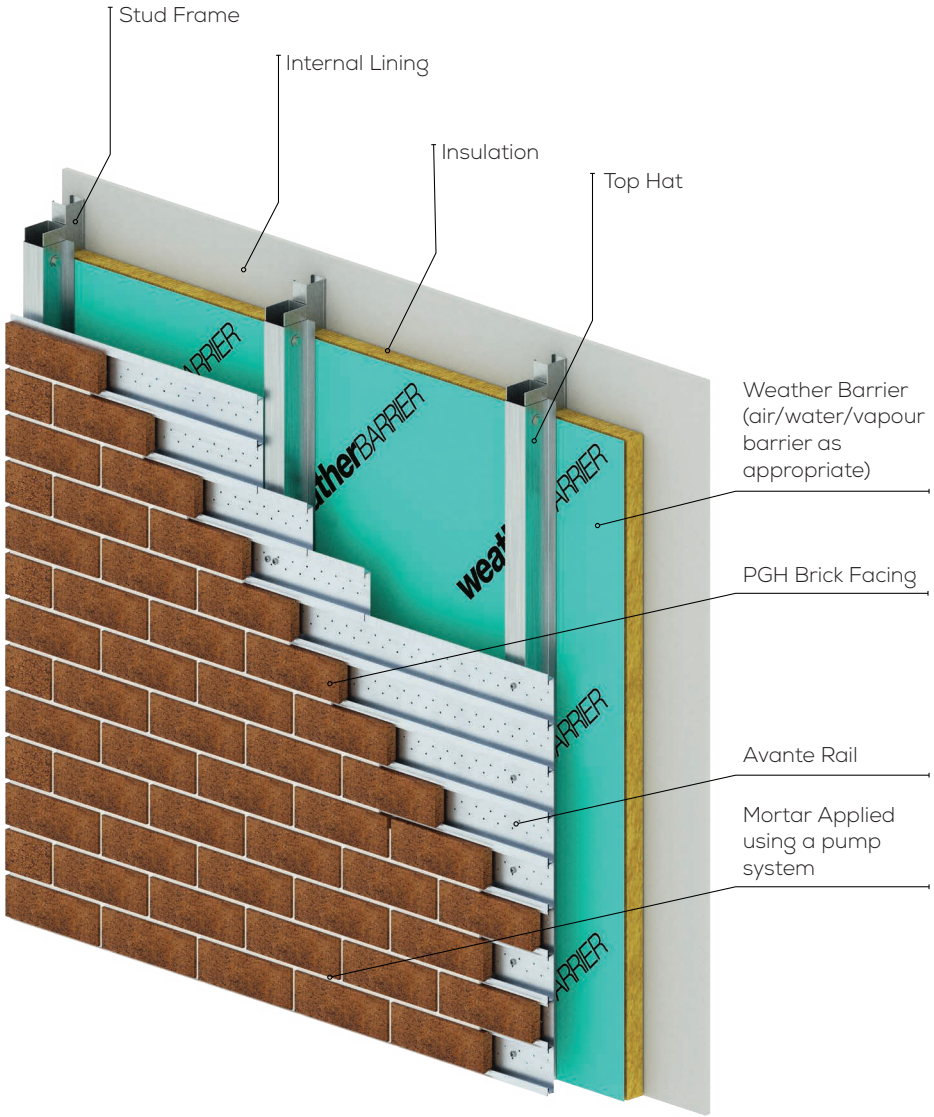
In no way does this Technical Manual replace the services of the building design professionals required to design and oversee projects, nor is it an exhaustive guide of all possible scenarios. It is the responsibility of the building design professional, including the project Certifier, to ensure that the details in this Technical Manual are appropriate for the intended application.

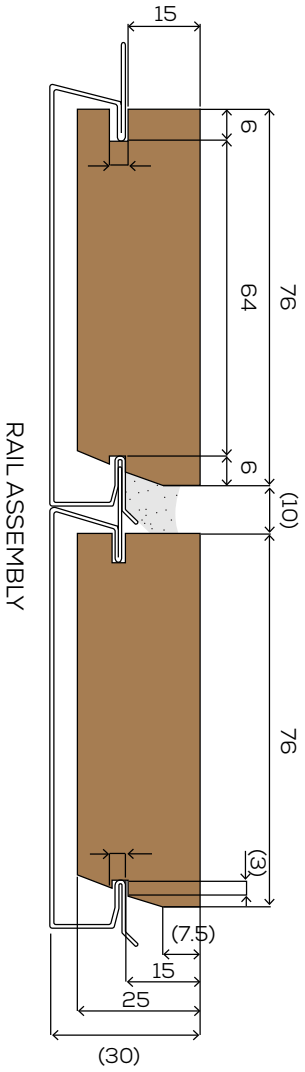
For additional information and assistance with the Avante system, please contact PGH Bricks & Pavers on avante@pghbricks.com.au.

Avante
A brick walling system

02 DESIGN AND SELECTION

Fig 1: The Avante System





2.1 System Description

The Avante system comprises of thin brick facings, nominally 25mm thick, 230mm long, and 76mm high, which are cut from PGH's range of traditional bricks, confirming to the requirements of AS/NZS 4455.1 'Masonry units'.

The thin brick facings are specially manufactured to ensure they mechanically fix into the steel backing section, which consists of successive courses of horizontal steel rails, with each course of rail interlocking into the rail above and below. Depending on the corrosivity category of the site, the rail can be supplied as galvanised or stainless steel.

Each individual row of rails is profiled to house 1 standard brick course. The thin brick facings come with a nominally 6 mm deep saw cut notch that is cut in-plane on their top and bottom surfaces, which the specially profiled backing rail engages into. Furthermore, a rebate is included on the bottom of the facings to allow for ease of clipping into the profiled backing rail. The rail profile is uniquely designed to provide a high strength façade, ensuring a high pull out strength of both the facings and mortar.

The Avante system is fixed onto a vertical support system (conventionally this is a G2 Z275 coated steel top hat or top hat with cleat system but other options are available per site location and substrate), incorporating a free draining ventilated cavity of at least 25mm, which is then fixed to the substrate (concrete, permanent formwork, timber framing, lightweight steel framing, masonry, etc...). The Avante system incorporates weep holes at its base to ensure adequate cavity ventilation and drainage. Mortar is added to the surface using purpose designed tools.

Via utilising PGH's traditional range of bricks, the Avante system can look identical to traditional brick, utilising corner units at windows and reveals.

* Conventional Avante brick facings vary in thickness depending on the specific unit they are being cut from. Avante units are not confined to the thicknesses mentioned. If greater thicknesses are desired, it is the responsibility of the project design professional to assess the suitability of the system based on the increased brick facing weight as existing pull-out strength results apply to standard sized Avante brick facings. Please contact PGH if you are considering doing so.

2.2 Benefits of the Avante System

- Lightweight – approximately 55kg/m^2, compared to approximately 200kg/m^2 for traditional brick
- Seamless integration with traditional masonry – Avante brick facings are cut from PGH Bricks & Pavers' extensive range. Note – some exclusions apply, please speak to your PGH representative to find out more.
- Reduced site space requirements – allows for the brick look where tight boundaries would usually restrict usage
- Can be used for both internal and external applications
- On-site flexibility that enables shaping to suit building details and achieve seamless brickwork around corners, windows and doors
- Reduced materials handling requirements
- Reduced waste and mess onsite
- Strong, durable and weather resistant
- Non-combustible
- Can be fixed onto all common substrates
- Safe choice with 'brick grip' design
- Extensive range of colours and textures – ability to use any brick within the PGH Bricks & Pavers collection
- NCC compliant
- Low maintenance
- Backed by CSR – the name behind some of Australia and New Zealand's most trusted building industry brands

2.3 Applications

PGH's Avante system is suitable for all building classes 1 to 10, providing the intended location is under non-cyclonic wind load, no greater than 4kPa.

The Avante system, as part of a whole external wall assembly, has been certified as being compliant to the requirements of the NCC for structure, weatherproofing and non-combustibility, however the system itself does not offer a fire resistance level.

Site environmental factors such as wind pressures and corrosivity zones need to be taken into account when specifying the appropriateness of the system and the components for the intended location.

PGH does not recommend the Avante system being used in soffits or as roof cladding. Please contact PGH if you are considering doing so.

2.4 System Components

Note: The components used in the Avante system will differ depending on class of building, site location, substrate, etc...

Please consult with section 3 of this manual for correct application of component options, section 4 for system diagrams, and section 5 for the installation process.

2.4.1 Brick facings (fired clay)

The brick facings are cut from PGH's existing range of masonry units compliant to AS/NZS 4455.1 'masonry units', and tested to the appropriate AS/NZS 4456 standards.

- Generic properties of the thin brick facings are summarised in table 1 below:

Table 1: Unit properties and characteristics

Dimensions AS/NZS 4456.3	Nominally 230mm x 25 mm x 76mm.
Breaking load AS/NZS 4456.5	›1MPa
Coefficient of expansion AS/NZS 4456.11	Less than 0.008mm/m/°C, providing a maximum service life ambient air temperature of 40°C
Water absorption AS/NZS 4456.14	Less than 10%
Initial Rate of Absorption AS/NZS 4456.17	Less than 1.0 kg/m^2/min
Durability Class AS/NZS 4456.10	General Purpose or Exposure Grade as required by the site's corrosivity category (see section 3.3)
Combustibility	Clay masonry units are non-combustible.

Note

- Because the brick facing are cut from PGH's existing range, the properties and thickness of the facings will vary depending on the characteristics of the specific product range chosen.
- Values presented above are nominal values only and may differ. For specific values for the unit intended for your project, please contact PGH.
- The system (25mm brick facing, mortar and 0.55BMT steel rail) weighs approx. 55 kg/m2 as per AS/NZS 1170.1.

2.4.2 Mortar Pointing

Alike traditional brickwork, the mortar is mixed onsite. The following mortars, which are considered as being non-combustible, are appropriate for use with the Avante system:

- M3 (1:5 with a methyl cellulose water thickener), as per AS 3700.
- M4 (1:4 with a methyl cellulose water thickener), as per AS 3700.

Pre-bagged mortars based on a M3 traditional AS 3700 mortar mix, in a range of colours and designed for use in pumped systems are also available. If using one of these products, follow the manufacturer's instructions and ensure that it complies with the requirements of this manual (for example, non-combustibility).

Refer to section 3.3 for appropriateness of mortar class for corrosivity category.

2.4.3 Sealants

All movement joints, gaps between sections of rail, framing, doors, abutments and penetrations in the Avante system must be filled with an appropriate proprietary filler or sealant that is chemically compatible with the Avante system (including non-staining) and it should be accompanied with a backing rod as per the sealant manufacturer's instructions.

Sealants should be designed and installed in accordance with the sealant manufacturer's specifications.

Please see section 3.2 for movement joint spacings, location and width.

2.4.4 Rail

The Avante rail is conventionally manufactured from Grade G2 steel with a base metal thickness (BMT) of 0.55mm, and total coated thickness (TCT) of 0.59mm, compliant with AS 1397 'Continuous hot-dip metallic coated steel sheet and strip'.

The rail is supplied in 2400mm lengths and can be galvanised or supplied as a stainless steel.

Note

- Zincalume and other coating systems containing aluminium, which are not pre-painted in accordance with AS 2728, are not appropriate for use with the Avante system due to adverse reactions with wet cementitious materials such as mortar. AM coatings are appropriate provided that the trim's AM substrate is prepainted in accordance with AS2728.
- Steel is considered to be non-combustible. Coatings used are less than 1mm thick when applied, and thus under C1.9 and 3.7.1.1 of the NCC volume 1 and volume 2 respectively, can be used wherever a non-combustible material is required.

2.4.5 Vertical supports

The Avante rail is connected to the substrate via vertical supports.

Framing	Substrate
Vertical[1] and horizontal top hats[2] (BMT 0.75/1.15)	Steel or timber stud wall
Vertical Top hats (BMT 1.15)[1] + Cleats (BMT 1.9, 100mm long)	Steel or timber stud wall Solid concrete or masonry
Vertical inverted top hats[1] (BMT1.15)	Steel or timber stud wall
NVELOPE rail and bracket[3]	Steel or timber stud wall Solid concrete or masonry

Notes for Table 2:

1. Cold formed steel top hats need to be with a height of at least 25 mm with yield stress no less than 270 MPa, tensile strength at least 330 MPa, manufactured to AS 1397 and designed in accordance with AS 4600;
2. Horizontal top hats (of at least 25mm height), firstly fixed to the studs, then vertical top hats (of at least 25 mm height) placed on top;
3. Aluminium 'helping-hand' brackets, with a thickness of at least 2.5 mm, grade 6005-T5, designed in accordance with AS 1664, and provided that they are at least 25 mm in height;
4. Refer to Fig 2 for specification of the above options.

If the stud set out does not align with the vertical support set out, horizontal top hats will have to be first fixed to the studs, and then vertical top hats (of at least 25mm height) placed on top, connecting to the Avante rail. If this method is used, precautions will need to be made for the affect that the weight of the Avante system has in compromising the performance of the horizontal top hat. Please consult with the manufacturer of the horizontal top hat and/or building design professionals.

Vertical supports are to be anchored to the substrate in accordance with section 2.4.8 and/or the instructions of the vertical support manufacturer and/or fastener manufacturer.

The vertical support and rail are connected to each other using self-drilling screws in accordance with section 2.4.8.

Spacing of supports (top-hats, cleats, or helping hand brackets), and spacing of fixings along supports, are to be in accordance with section 3.1.1.2.

Always ensure that the intended vertical support is appropriate for the site corrosion category and is compatible with the materials it is being connected to/with. See section 3.3 for details.

2.4.6 Substrate

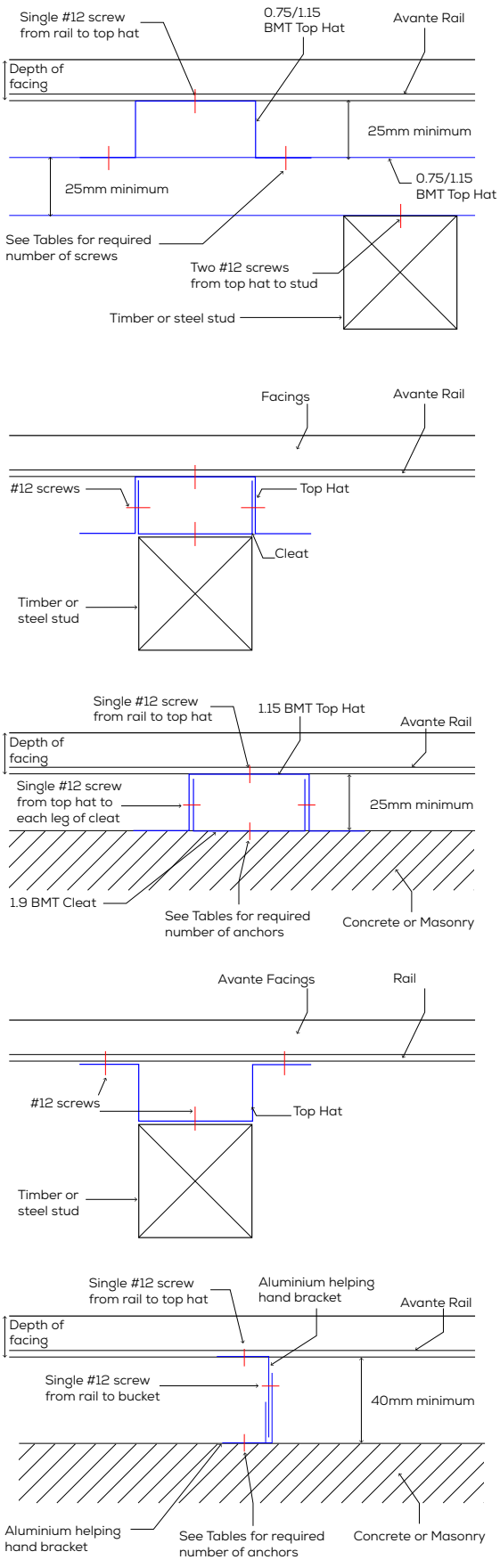
The Avante system is compatible with a variety of substrates, including but not limited to:

- Concrete designed in accordance with AS 3600,
- permanent formwork such as AFS, designed in accordance with the manufacturer's instructions,
- timber framing designed in accordance with AS 1720 and/or AS 1684,
- structural steel in accordance with AS 4100,
- lightweight steel frames in accordance with AS 4600 and/or the NASH standard,
- masonry in accordance with AS 3700 and/or AS 4773.

Vertical supports are to be chosen with consideration for the type of substrate (see section 2.4.5) and be fixed onto the substrate as per section 2.4.8.

The substrate must be correctly designed in accordance with the above, and with consideration for the weight that the Avante system will place on the substrate.

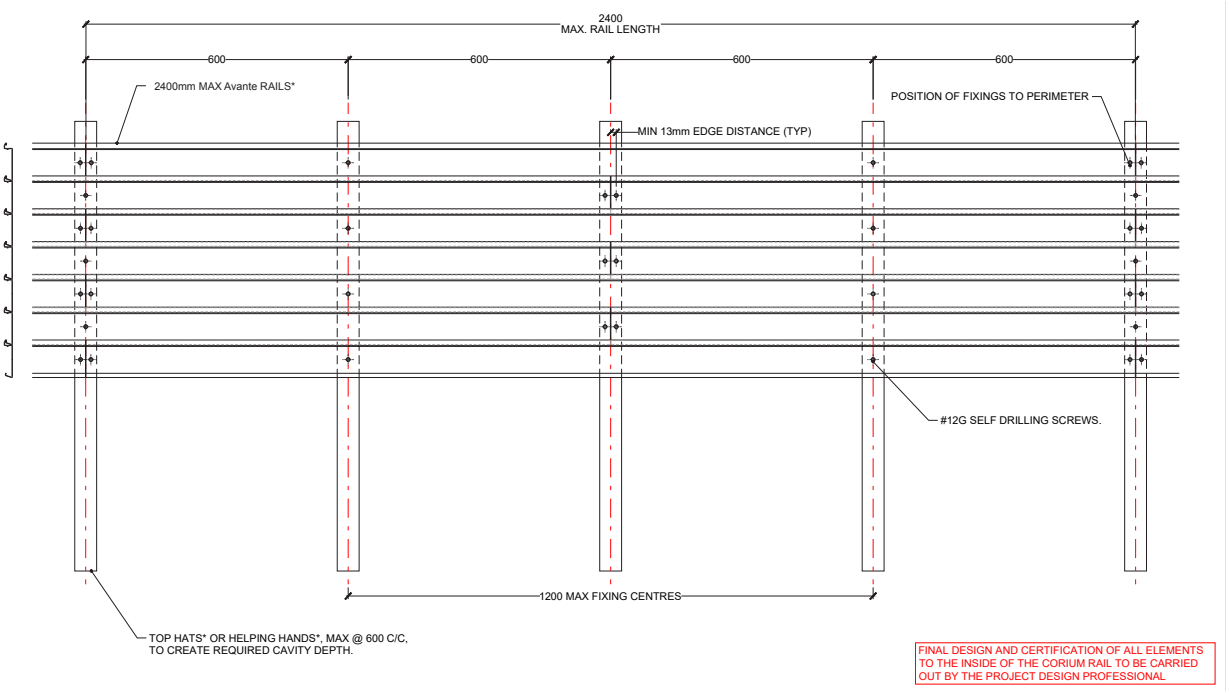
Fig 2: Avante supporting systems



2.4.7 Air/water/vapour barrier

When a weatherproof external wall is required, an appropriate rigid air barrier, or pliable building membrane manufactured to AS 4200.1 and installed in accordance with AS 4200.2 is required to be fitted over the substrate prior to the Avante system being installed.

Fig 7: Permissible set out for rail and staggered fixings (selected appropriately as above and spaced at 1200mm c/c) for ultimate wind loads less than 3kPa



For site wind loads between 3 kPa and 4kPa, the following fixing sizes are suitable for fixing rails tot he support structure:

- Two #10 self-drilling screws every 600mm c/c or
- One #12 self-drilling screws every 600mm c/c

The above requirements assume the rail is fixed into one of the following materials:

- Steel top hat, thickness ≥ 0.75 mm, fy ≥ 270 MPa, fu ≥ 330 MPa
- 6005-T5 aluminium bracket, thickness ≥ 2.5 mm (typical NVELOPE bracket)

Where alternate materials are used to support the rails, the project engineer is to confirm that the supporting material has sufficient capacity to prevent pullout and bearing failure of screws.

Ensure that the choice of system considers how the building will be used, and is appropriate for the construction chosen, the site's climate and wind loads.

PGH recommends appropriate sarking or air barrier products be used for up to 4kPa wind pressures that are higher.

2.4.8 Fixings

Self-drilling (flat top) #10 or #12 Tek screw fixings compliant with AS 3566 are used to fix the Avante rail to the vertical supports (and the corner angle trim where required).

Galvanised screws are appropriate with galvanised steel rails. Stainless steel screws are appropriate for both galvanised steel rails and stainless-steel rails. When using aluminium helping hand brackets, consult with the manufacturer of the product for appropriate fixing selection.

The fixings head height should be low enough to ensure that is fits underneath the rear face of the avante facing and does not interfere with installation. This can be achieved with pan/flat headed fixings.

Spacing of supports (top-hats, cleats, or helping hand brackets), and spacing of fixings along supports, are to be in accordance with section 3.1.1.2.

For wind loads up to 3kPa, the following fixing sizes are suitable for fixing rails to the support structure:

- One #10 self-drilling screw every 600 mm c/c; or
- Two #10 self-drilling screws every 1200 mm c/c; or
- One #12 self-drilling screw every 1200 mm c/c.

Where rails are fixed every 1200 mm c/c, screws must be staggered such that at every support, vertically every second rail is fixed to the support, but noting that the rail ends must be fixed to a support, as per Figure 7.

For site wind loads between 3kPa and 4kPa, the following fixing sizes are suitable for fixing rails to the support structure:

- Two #10 self-drilling screws every 600mm c/c, or
- One #12 self-drilling screws every 600 mm c/c.

The above requirements assume the rail is fixed into one of the following materials:

- Steel top hat, thickness ≥ 0.75 mm, fy ≥ 270 MPa, fu ≥ 330 MPa
- 6005-T5 aluminium bracket, thickness ≥ 2.5 mm (typical NVELOPE bracket)

When fixing:

- Cleats or horizontal top hats onto steel studs, #12 Tek screws are appropriate.
- Cleats or horizontal top hats onto timber studs, # 12 timber screws are appropriate, provided that at least 70mm embedment is achieved.
- Vertical top hats onto horizontal top hats, # 12 Tek screws are appropriate.
- Top hats or cleats onto a concrete or solid masonry substrate, M8 anchors are appropriate, provided that 60mm embedment is achieved.
- Cleats or helping hand brackets onto a concrete or solid masonry substrate, M8 anchors are appropriate provided that 60mm embedment is achieved for concrete substrates, and 80mm embedment is achieved for masonry substrates.

Note

- Timber stud: Joint Group J6/JD6 or higher as defined by AS 1720.1 as required.
- Timber screw capacities assume fixing to the side grain of the timber.
- Prior to inserting timber screws, the hole should be pre-bored/pre-drilled as required by AS 1720.1.

It is recommended that the fixings attached to the substrate and through the air/water/vapour barrier, incorporate an integral sealing washer (EPDM or similar) under the head. When fixing onto a hollow brick or block substrate, required reaction forces of the fixings are provided in table 2 below.

Always ensure that the intended fixing is appropriate for the site corrosion category. See section 3.3 for details.

Where alternate materials are used to support the rails, the project engineer is to confirm that the supporting material has sufficient capacity to prevent pullout and bearing failure of screws.

For substrates not provided, please contact PGH for guidance.

Table 2: Required reaction forces for fixings into hollow brick/block substrates per support system based upon thermal movements

	Total reaction forces for fixings into hollow brick or concrete block. O.75 or 1.15 BMT top hats spaced @ 600mm c/c, spanning 600mm. 100mm long, 1.9 BMT cleats spaced @ 600mm c/css						Total Reaction forces for fixing into hollow brick or concrete block. Helping hand bracket rail spaced @ 600mm c/c, spanning 600mm. Helping hand brackets (at least 40mm height) spaced @ 600mm c/c		Total Reaction forces for fixing into studs (top hat on top hat scenario). 0.75 BMT top hats spaced @ 600 mm c/c, spanning 600mm					
Cleat depth	25mm		35mm		≥ 45mm		≥ 40mm		25mm		35mm		≥ 45mm	
Joint spacing (m)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)
4	0.8	1.2	0.5	0.9	0.15	0.5	0.25	0.2	0.24	0.2	0.12	0.14	0.05	0.08
5	1	1.4	0.6	1.1	0.2	0.6	0.3	0.25	0.32	0.24	0.16	0.16	0.07	0.1
6	1.2	1.7	0.7	1.3	0.25	0.7	0.35	0.3	0.38	0.28	0.18	0.2	0.08	0.11
7	1.4	2	0.8	1.5	0.3	0.9	0.4	0.35	0.44	0.32	0.22	0.22	0.09	0.13
8	1.6	2.3	0.9	1.7	0.35	1	0.45	0.4	0.5	0.38	0.24	0.26	0.11	0.15
9	1.8	2.5	1	1.9	0.4	1.1	0.5	0.45	0.56	0.44	0.28	0.28	0.12	0.17
10	2	2.8	1.1	2.1	0.45	1.2	0.55	0.5	0.62	0.46	0.3	0.32	0.13	0.19

2.4.9 Trims

Corner angle trim compliant to AS 1397 (BMT approx. 0.55mm) or an appropriately graded stainless steel, is required at corner junctions to ensure uniformity of the intersecting rail junctions, stability of the cantilevered section and prevention of moisture penetration.

Corner trim chosen must be compatible with the materials it is fixed to and suitable for the sites corrosivity environment. See section 3.3 for details.

2.4.10 Flashing

Flashings used with the Avante system should be in accordance with AS/NZS 2904, provided they are appropriate for the location in which they are being specified.

It is, however, recommended that a galvanised steel flashing compliant to AS 1397 or stainless-steel flashing be used with the Avante system.

Ensure that the flashing material chosen is appropriate for the corrosivity location in which the system is being installed and that it is compatibility with the other materials being used, including the rail. See section 3.3 for details.

2.4.11 Weep hole screen

A horizontal weep hole screen is required at 1200mm centres at the panels base and at slab/floor edges to ventilate the cavity space and (via the flashing) allow drainage of moisture from the cavity.

2.5 Colour and layout options

Brick facings for use in the Avante system are available in a wide variety of colours and textures from PGH's existing range of products. For more information on what's available, please visit pghbricks.com.au/avante.

Avante
A brick walling system

03 SYSTEM PERFORMANCE AND ENGINEERING

3.1 NCC Compliance

The Avante system is a non-loadbearing rain screen façade intended for use in low to medium rise residential commercial applications and internal fit outs.

The Avante system includes the brick facings, mortar, rails and fixings to the vertical support structure. The vertical supporting structure and substrate is not part of the Avante system.

Note: If Avante is being considered for situations outside of this scope, please contact PGH.

Avante is subject to the requirement of Volume 1 and 2 of the National Construction Code (NCC).

Provided that the instructions within this technical manual are followed, Avante has been deemed to meet the relevant performance requirements of the NCC, pertaining to:

- Structure: Section B (NCC volume 1) and Section 2.1 (NCC volume 2).
- Fire: Section C (NCC volume 1) and Section 2.3 (NCC volume 2).
- Damp and Weatherproofing: Section F1 (NCC volume 1) and Section 2.2 (NCC volume 2)

The brick facings have been cut from traditional clay masonry units compliant to the requirements of AS/NSZ 4455.1. Specifically, PGH units are tested in accordance with the AS/NZS 4456 suite.

The cold formed steel rail, top hats, and fixings connecting the two are designed in accordance with AS 4600.

3.1.1 Structural performance:

The Avante system includes the brick facings, mortar, rails and fixings to the vertical support structure. The vertical supporting structure and substrate is not part of the Avante system.

The Avante system has been certified as complying with the relevant requirements of Section B NCC volume 1 and Section 2 NCC volume 2.

The building design professionals are responsible for the design of the support structure, movement joint locations (except as limited by section 3.2), joint sealants, flashings and NCC compliance of the overall wall assembly.

The Avante system can be fixed to all common substrates, provided that the appropriate fixings are chosen and used in the required manner for the substrate, intended loads, and corrosivity category of the location. See section 2.4.8.

The vertical supports must also be appropriate to the substrate and corrosivity category, see section 2.4.5. Note that the Avante rails require minimum 25mm deep 0.75 BMT vertical top hats spaced in accordance with section 3.1.1.2, and fixed to the substrate in accordance with section 2.4.8.

The substrate must be correctly designed by the building design professional in accordance with section 2.4.6, with consideration for the weight that the Avante system will place on the substrate.

Top hats screws, brackets, cleats etc. inboard of the Avante rails shall be designed and certified by the building design professional. These elements, shown on the specification drawings herein (see section 4), are provided for information only and should not be relied upon for final design.

3.1.1.1 System Weight:

Design weight of the entire Avante system nominally 55kg/m^2

Note: The weight of the Avante system may vary depending on materials used.

3.1.1.2 Wind Performance / Span Tables

Provided that the rail is in accordance with section 2.4.4, the vertical supports are in accordance with 2.4.5, and fixings are in accordance with section 2.4.8, based on an allowable system deflection of span/500 (as per AS 3700), the following applies:

Residential buildings (class 1 and 10):
Table 3: Maximum Avante rail spans, per wind classification, on residential buildings

Wind Classification (AS 4055)	Maximum rail span between vertical supports		Maximum allowable cantilever span of Avante rail, out from the vertical support (mm)*	
	Panel Zone (areas greater than 1200mm from an external building corner)	Corner Zone (areas within 1200mm of the external building corner)	Panel Zone (areas greater than 1200mm from an external building corner)	Corner Zone (areas within 1200mm of the external building corner)
N1	600	600	450	450
N2	600	600	450	400
N3	600	600	400	350
N4	600	600	400	300
N5	600	600	350	NA

* Cantilever sections of rail should be avoided; however, in certain situations the rail may have to cantilever out from the vertical support such as at corners, openings, control joints, and other abutments. For cantilevered sections of Avante rail, there must be a back span (simple supported or continuous) of no more than 600mm.
* Consult PGH on appropriate unit for your designated non-cyclonic wind load since engagement capacity varies among Avante units.

Commercial buildings (class 2 – 9)
Vertical supports and fixings should be spaced at maximum 600mm centres for up to 3kPa wind pressures.

The Avante system has been analysed and tested for pull-out strength of the facings and is appropriate for up to 4kPa non-cyclonic wind pressures. **Consult PGH regarding the appropriate unit for your designated non-cyclonic wind load as the engagement capacity varies based on the composition of differing bricks.**

For loads greater, please contact PGH for maximum allowable spans.

For cantilevered sections of the Avante rail (such as at corners, openings, control joints, and other abutments), the distance from the vertical support to the end of the cantilevered rail section should be spaced no more than as indicated in Table 4 below. Cantilevered sections of Avante rail must have a back span (simply supported or continuous) of no more than 600mm.

Table 4: Maximum Avante Rail spans, per ultimate wind load, on commercial buildings

Wind load (kPa)	Cantilevered span (mm)
4kPa	300mm
3kPa	350mm
2kPa	400mm
1kPa	450mm

For site wind loads greater than those listed, please consult with PGH.

3.1.1.3 Earthquake performance

Earthquake loads in Australia generally do not govern the design of a lightweight façade system such as Avante, as the low self-weight of the façade translates to low equivalent static loads under earthquake conditions. These loads are small compared to the ultimate wind loads that Avante is subject to.

The project engineer must still confrm the location of movement joints, adequacy of the supporting system and substrate, and compliance of the overall walling system.

Where a dynamic analysis, as described in AS 1170.4, is used to determine earthquake loads on a structure, the project structural engineer is to review the above and determine if it is consistent with the project's dynamic analysis.

3.1.2 Fire performance.

All components (facing, mortar, steel components) used in the Avante system are considered as being non-combustible and thus, for the purposes of the NCC's CP2 and P2.3.1 requirements, the Avante system is not considered to contribute to fire spread. Note that, in accordance with C1.9, although proprietary sealants and caulking are not required to be non-combustible for use in the system, it is recommended that they are.

Since the exposed components of the Avante system are non-combustible, and the external wall in which the Avante system is part of is likely to exceed 90mm, Avante is suitable for use in bushfire prone areas up to a Bushfire Attack Level (BAL) of 19 provided that the Avante system is attached to, or part of, a compliant external wall system. Avante is not expected to be used in Flame Zones (FZ).

If being used in bushfire prone areas, any openings within the system greater than 3mm must be protected. Cavity barriers should be installed horizontally at each floor slab and vertically at every party wall or every 6m (whichever is the lesser distance).

The components used in the Avante system (brick facing, mortar, steel rail, steel screws) are not considered to be a fire hazard and are specifically exempt under the NCC Vol 1 C1.10(b) from needing to prove compliance with C1.10(a).

However, pliable building membranes used in the Avante system will have to comply with the fire hazard properties C1.10(a) via Specification C1.10. Please consult with the pliable building membrane manufacturer for advice on the suitability of their product.

Although the Avante system is likely to contribute to an external walls Fire Resistance Level (FRL) for insulation and integrity, AS 1530.4 testing has not yet been undertaken on external wall systems incorporating Avante, and thus, for the purpose of deriving a FRL, the contribution provided by the Avante system to the external walls FRL should be ignored.

In residential applications, the Avante system should not be used within 900mm from the boundary or within 1800mm from an adjacent building, unless the external wall it is a part of (or the substrate it is being attached to) achieves an FRL of at least 60/60/60.

Since the Avante system does not contribute to the external walls FRL, the sealants used with the Avante sysyem are also not required to be fire rated. Fire rated sealants may, however, be required in the substrate Avante is being attached to in order to maintain their FRL. Please consult with your building design professional on these aspects.

3.1.3 Thermal performance.

Avante is generally used as part of a well-ventilated wall system. Therefore, when determining the total R-value for external wall systems of commercial buildings (class 2 -9) incorporating Avante, the contribution provided by the Avante system and cavity is generally ignored in accordance with AS/NZS 4859.2. That is, unless a horizontal weep hole screen is provided at 1200 mm centres at slab/ foor edge control joints with the sections in between weep hole screens being sealed.

In this case, the system may potentially be considered by AS/NZS 4859.2 as beingslightly ventilated, in which case some contribution provided by the Avante system and cavity may potentially be considered in determining the system's R-value.

These aspects should be determined by the building design professional.

3.1.4 Weatherproofing performance

The Avante System has been assessed as meeting the performance requirements of NCC Volume 1 FP1.4 and Volume 2 P2.2.2 for weatherproofing.

The Avante System forms the outer rainscreen of a ventilated system. Based on testing to NCC volume 1 FV1.1 and Volume 2 V2.2.1, a weatherproof system can be achieved with Avante via:

- draining of the cavities as per section 2.4.11,
- a minimum cavity behind the Avante system of 25mm (typically formed by the 25mm vertical top hats), and
- a fully sealed air/water vapour barrier sufficiently robust to resist the design wind loads and movements.

The details of openings and joints in a facade system have a significant impact on its weatherproofing performance, meaning it must be designed appropriately. Special consideration should be given where Avante is used in conjunction with:

- Vertical and horizontal control joints;
- Wall junctions;
- Windows and doors;
- Electrical boxes;
- Balcony drainage and parapet flashings; and
- Footer and header termination systems

Where the substrate of the main structure is discrete (e.g. a stud wall), an air barrier is used to create a continuous surface.

Note:

- An air/water/vapour barrier, as appropriate, in accordance with section 2.4.7 must be used, must be sealed, and suitable for the intended wind loads and installed over the substrate prior to the installation of the Avante system.
- Windows must be of a front drainage style and have appropriate flashings to prevent moisture ingress.
- It is also important to seal any cut edges to protect against moisture penetration into the cavity space.
- The system requires a drained horizontal weep screen (or similar drained system) at its base and at slab/floor junctions. See 3.1.2 above for any additional requirements for bush fire resistance.
- Consult with the project building design professional for the selection and location of a vapour barrier/ vapour permeable barrier to manage condensation risk noting that condensation will form on surfaces that are below the dew point temperature.

3.2 Movement Joints

Vertical and horizontal movement joints should be provided in the Avante system to accommodate thermal expansion/contraction of the materials in the system and possible movement/deflection in the overall structure/substrate that the system is attached to.

Ideally, movement joints should be located at points of potential weakness in the façade i.e. the corners of openings, at changes in panel height, etc... Movement joints provided in the panel layout should, however, be aligned with movement joints already provided in the supporting structure.

A horizontal control joint is required beneath slabs or angles to accommodate any expected deflection. The magnitude of the deflection must be verified by the building design professional.

To maintain the systems 'brick look', control joints placed in the Avante system should be a minimum of 15mm thick and be located where a mortar joint would normally exist. When setting out the avante system, design consideration should be given to the location of movement joints to ensure minimal cutting and prevent impractical scenarios with respect to rail and facing lengths.

Vertical movement joints should be placed in accordance with table 6 below:
Table 5: Maximum movement joint spacings

		Maximum Vertical movement joint spacing						
	Support system connected to the Avante rail, spaced at 600mm c/c, spanning 600mm	0.75 BMT top hat		1.15 BMT top hat		1.9 BMT cleat connected to 0.75BMT or 1.15BMT top hat		Helping hand bracket
	Vertical support system depth	25mm	≥35mm	25mm	≥35mm	25mm	≥35mm	≥40mm
Substrate	Steel stud**	10m	10m	6m	8m	8m	10m	N/A
	timber stud***	8m	10m	4m	8m	8m	10m	N/A
	solid concrete****	Not recommended				8m	10m	8m
	solid brick*****					8m	10m	8m

** Steel stud: 0.55 - 1.15BMT, fy ≥ 270MPa, fu ≥ 330MPa

*** Timber stud: Joint Group J6/JD6 or higher as defined by AS 1720.1.

**** Concrete: f'c ≥ 25MPa

***** Brick: f'uc ≥ 15MPa, f'cg ≥ 20 MPa (when attaching to grouted concrete masonry).

Vertical movement joints should be placed between vertical supports, with the maximum cantilevered span of the rail being in accordance with section 3.1.1.3.

Vertical movement joints should be placed at a maximum of 2400mm from corners.

On external corners,

- the intersecting rails should not butt up against each other and touch, and
- the outermost support (top hat, cleat, helping hand) should be stiffened at 300mm centres (vertically) using a suitable and non-combustible material. This can be achieved via securing a shear block (for example, an upside down and horizontally orientated top-hat) within the top hat supporting the system.

3.3 Corrosivity Category's

The Avante system is appropriate for all Australian corrosivity categories, provided that the components used (brick facings, mortar, rail, fixings, etc...) are chosen in accordance with this section.

ISO 9223 has suggested five corrosion zones based on the first year corrosion rate of mild steel. Refer to AS 4312 for details regarding Australian Atmospheric Corrosivity Categories (the below table summarise guidance from AS 4312).

Table 6: AS 4312 corrosivity categories

AS 4312 category	Corrosivity	Steel corrosion rate (µm/y)	Typical Environment
C1	very low	<1.3	Dry Indoors
C2	Low (most areas of Australia at least 50km from the coast or at least 1km from sheltered bays would be in this category)	1.3-25	Arid/ urban Inland
C3	Medium (from 1km to 10-50km from breaking surf – much of metropolitan Wollongong, Sydney, Newcastle and Gold Coast are in this category)	25-50	Coastal or Industrial
C4	High (primarily coastal areas - from several hundred metres to about 1km inland from breaking surf or from the shoreline to around 50m for sheltered bays)	50-80	Sea Shore (calm)
C5	Very high (industrial or marine) – common offshore and on the beachfront in regions of rough seas and surf beaches – can extend inland for several hundred metres (in some areas of Newcastle extends around 500m)	80-200	Sea shore (surf)

Table 8 and 9 in section 3.3.1 and 3.3.2 below summarise the coating options for the cold formed steel rails, supporting system, corner trim, mortar pointing, and brick facings.

Please note, it is critical that galvanic corrosion be avoided. Galvanic corrosion occurs when dissimilar metals are in contact, therefore compatible materials must be chosen or if dissimilar materials cannot be avoided, they must be suitably insulated from each other.

In the Avante system, the choice of screw/fastener must be compatible with all metals it is being used with.

As a general rule of thumb, the material/coating of the screw should be in the same class as that of the metals it is fastening. For example, if stainless steel rails are used, then stainless steel fasteners and top hats are required. In this scenario, the trim would thus also need to be stainless steel.

The manufacturer of the fixing must always be consulted to ascertain the correct screw material to use for the site corrosion category and for compatibility with the other materials chosen.

3.3.1 20 year service life

Table 7: Avante material requirements for a 20 year service life

AS 4312 Corrosivity Category	Cold Formed steel (rail and supports) Coatings as per AS 1397	Aluminium helping hand support coatings as per AAMA 2604, AAMA 2605, or AS 1231	Screw Corrosion Resistance Class as per AS 3566.2	Corner trim coatings/ materials	Mortar Class as per AS 3700	Brick Slip Resistance Grade as per AS 3700
C1, C2	Z275 Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA20, AA25	Class 1 Class 2 Class 3 Grade 304, 316 stainless steel	AM100, AM150* Z275 Grade 304, 316 stainless steel AA20, AA25	M2, M3, M4	General Purpose if subject to non-saline wetting and drying or in contact with non-aggressive soils Exposure Grade if subject to wetting and drying or in contact with aggressive soils.
C3	Z275 Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA20, AA25	Class 3 Grade 304, 316 stainless steel	Z275 Grade 304, 316 stainless steel. AA20, AA25	M2, M3, M4	
C4	Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA20, AA25	Class 4 Grade 304, 316 stainless steel	Grade 304, 316 stainless steel. AA20, AA25	M3, M4	
C5	Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA25	Grade 304, 316 stainless steel	Grade 304, 316 stainless steel	M4	Exposure Grade
T/CX	Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA25	Grade 304, 316 stainless steel	Grade 304, 316 stainless steel	By testing/ experience Contact PGH	By testing/experience Contact PGH

* AM coatings for the corner trim are appropriate provided that the trim's AM substrate is pre-painted in accordance with AS 2728. Bluescope steels Colorbond range of products qualify for this requirement, with Colorbond being AM100 and Colorbond Ultra being AM150. Zincalume or other coating systems containing aluminium, is not appropriate for use with the Avante system due to adverse reactions with wet cementitious materials such as mortar.

Notes

- Always seek out a warranty from the screw manufacturer to ensure galvanic corrosion is managed and to ensure screws are appropriate if no corrosion resistance class or corrosivity environment is referenced.
- The appropriateness of the AM coatings per corrosivity category has been completed in accordance with Bluescope documents. If intending to use an AM coating from a different manufacturer, please consult with that manufacturer to ensure the coating is appropriate for the intended use. In accordance with Bluescope documents, use class 3 fasteners with Colorbond. Bluescope do not recommend stainless steel fasteners be used with Colorbond.

3.3.2 50 year service life

Table 8: Avante material requirements for a 50 year design life

AS 4312 Corrosivity Category	Cold Formed Rail Coatings as per AS 1397	Aluminium helping hand support coatings as per AAMA 2605 or AS 1231	Screw Corrosion Resistance Class as per AS 3566.2	Mortar Class as per AS 3700	Brick Slip Resistance Grade as per AS 3700
C1, C2	Z275 Grade 304, 316 stainless steel	Powder coat (AAMA 2605) AA20, AA25	Class 1 Class 2 Class 3	M2, M3, M4	M2, M3, M4
C3	Grade 304, 316 stainless steel	Powder coat (AAMA 2605) AA20, AA25	Class 3	M2, M3, M4	M2, M3, M4
C4	Grade 304, 316 stainless steel	Powder coat (AAMA 2605) AA25	Class 4	M3, M4	M3, M4

Notes

- Always seek out a warranty from the screw manufacturer to ensure galvanic corrosion is managed and to ensure screws are appropriate if no corrosion resistance class or corrosivity environment is referenced.
- The appropriateness of the AM coatings per corrosivity category has been completed in accordance with Bluescope documents. If intending to use an AM coating from a different manufacturer, please consult with that manufacturer to ensure the coating is appropriate for the intended use.

Avante
A brick walling system

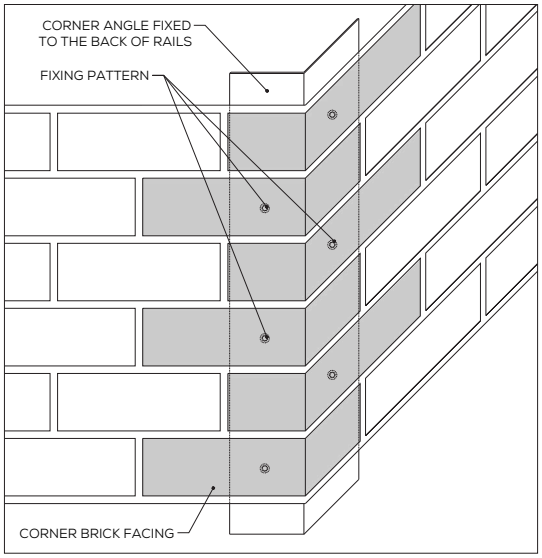
04 SPECIFICATION DRAWINGS

04 SPECIFICATION DRAWINGS

Avante
A brick walling system

*NOTES:

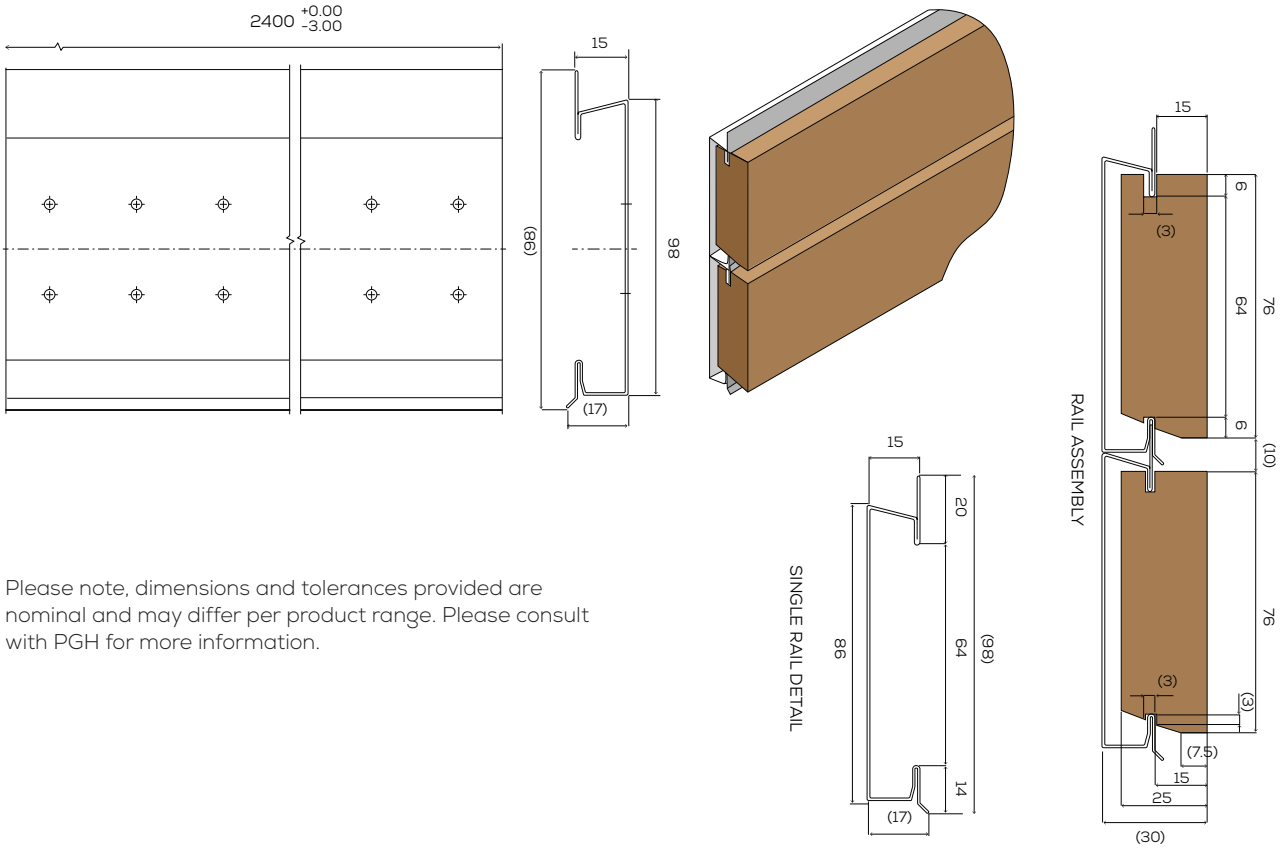
1. SEE SECTION 3.3 FOR MATERIAL SELECTION FOR CORROSIVITY ENVIRONMENT.
2. SEE TABLE 3 & 4 (CANTILEVER SPAN TABLE) FOR MORE INFORMATION ABOUT AVANTE RAIL CANTILEVER SPAN REQUIREMENTS.
3. SEE BELOW FOR CORNER ANGLE FIXING PATTERN



01 CORNER ANGLE FIXING PATTERN
SCALE N/A

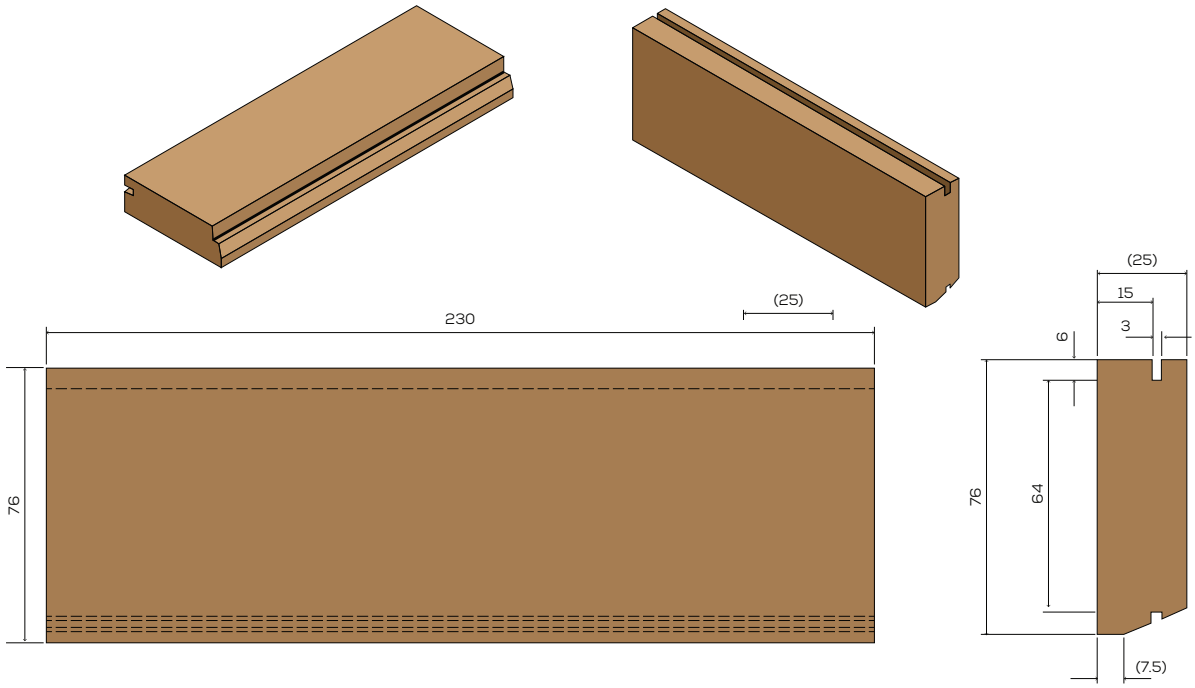
FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

Fig 3: Avante rail detail



Please note, dimensions and tolerances provided are nominal and may differ per product range. Please consult with PGH for more information.

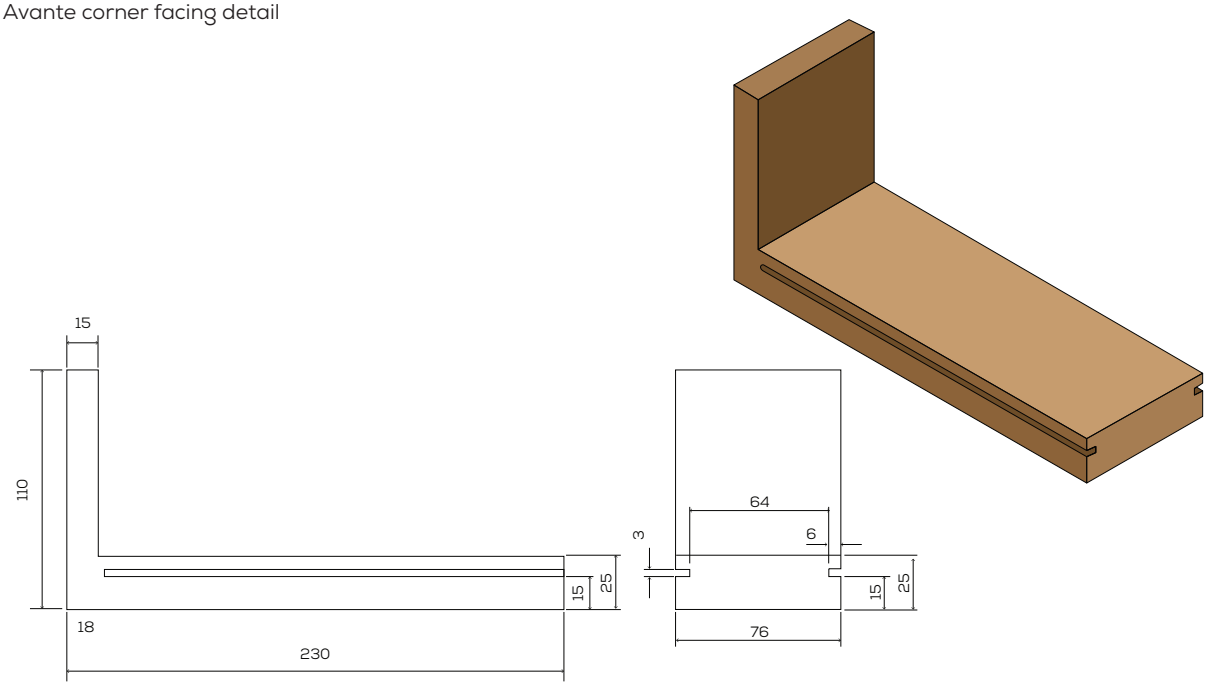
Fig 4: Avante facing detail



Please note, although dimensions and tolerances provided accurately represent the majority of products, they are nominal and may differ for certain product ranges. Please consult with PGH

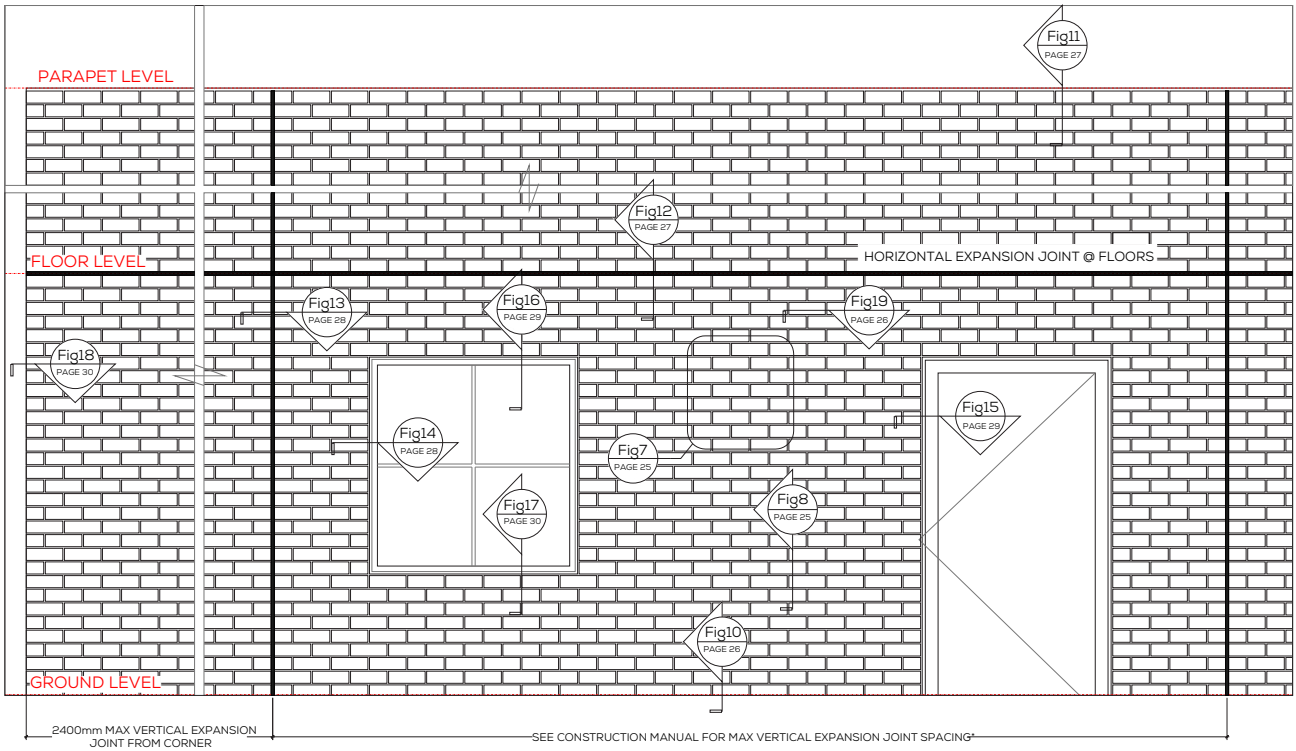
04 SPECIFICATION DRAWINGS

Fig 5: Avante corner facing detail



Please note, although dimensions and tolerances provided accurately represent the majority of products, they are nominal and may differ for certain product ranges. Please consult with PGH for more information.

Fig 6: Typical Elevation



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

Fig 7: Fixing pattern

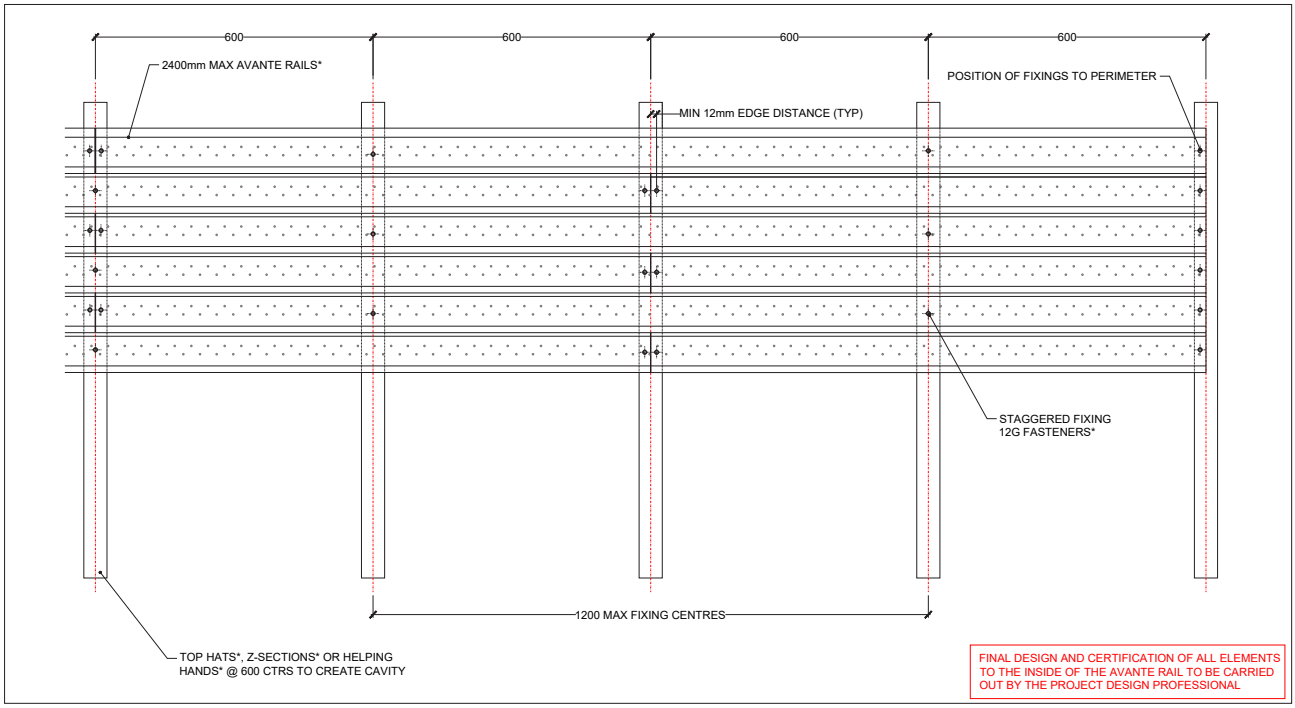
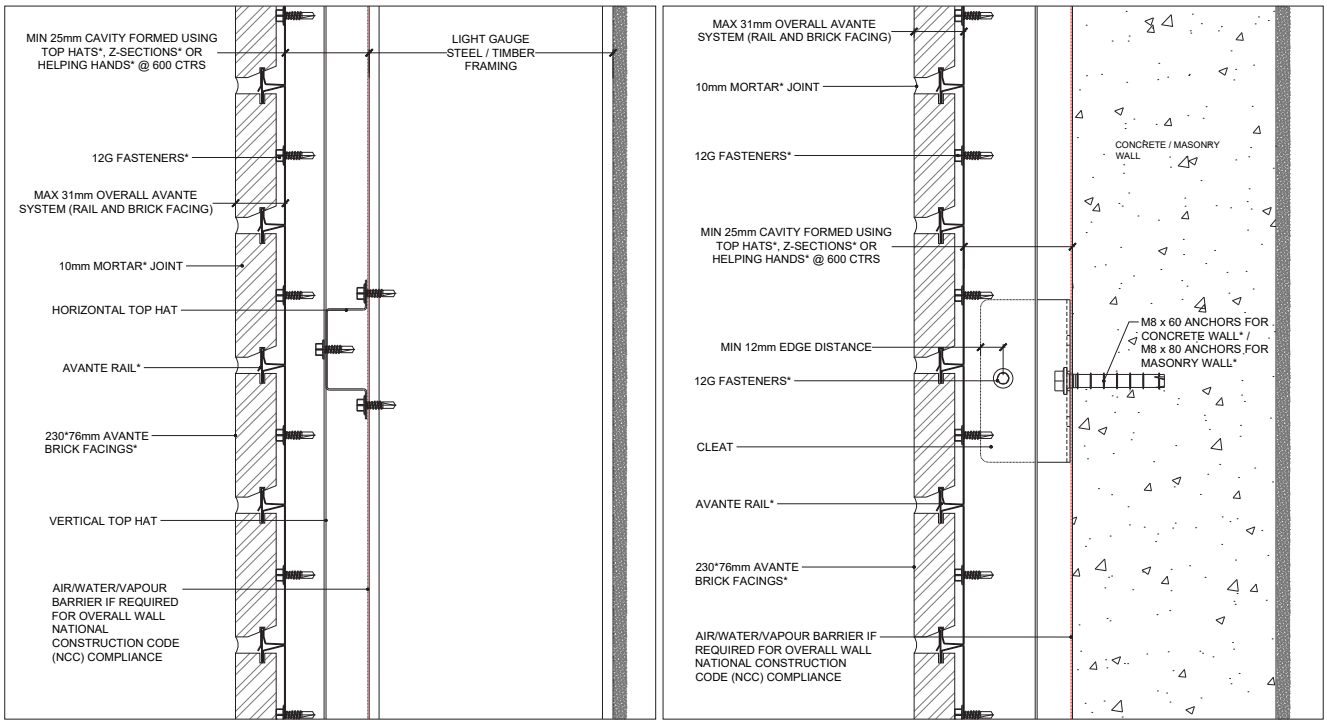


Fig 8: Typical Avante wall section side view



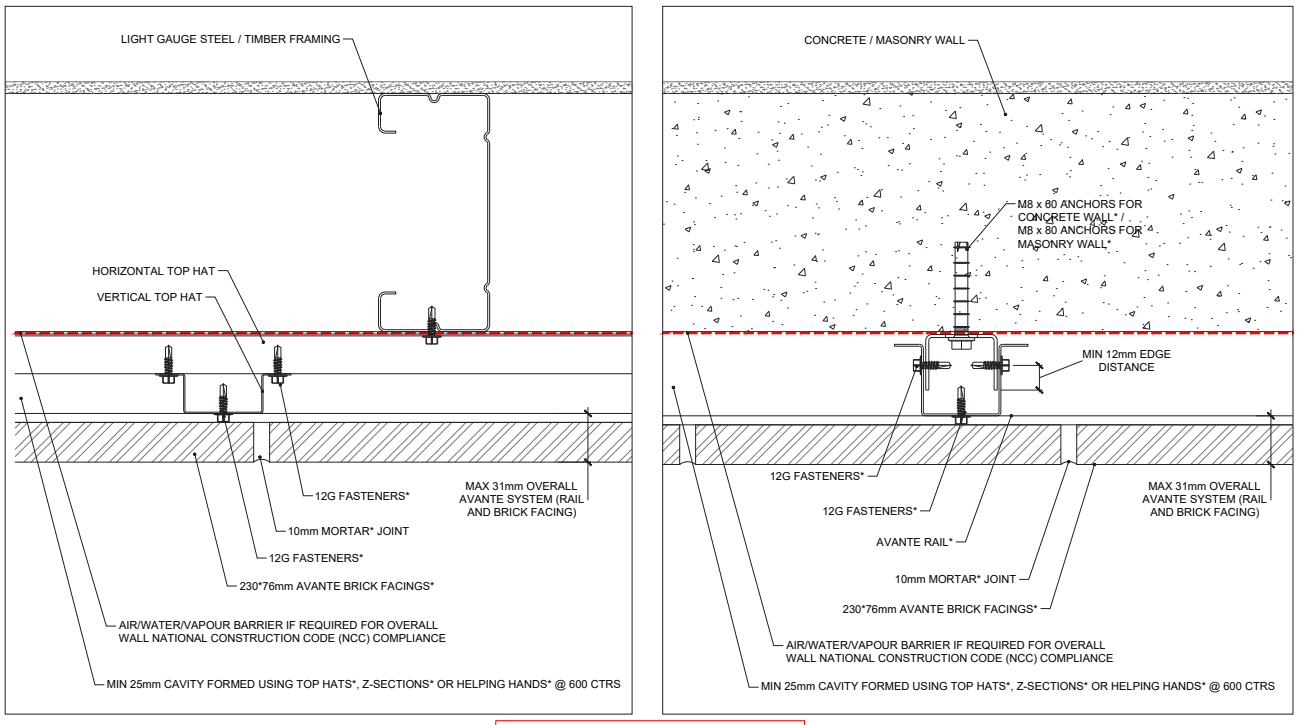
01 TYPICAL LIGHT GAUGE STUD FRAMING
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 TYPICAL CONCRETE WALL
SCALE N/A

04 SPECIFICATION DRAWINGS

Fig 9: Typical Avante wall section top view

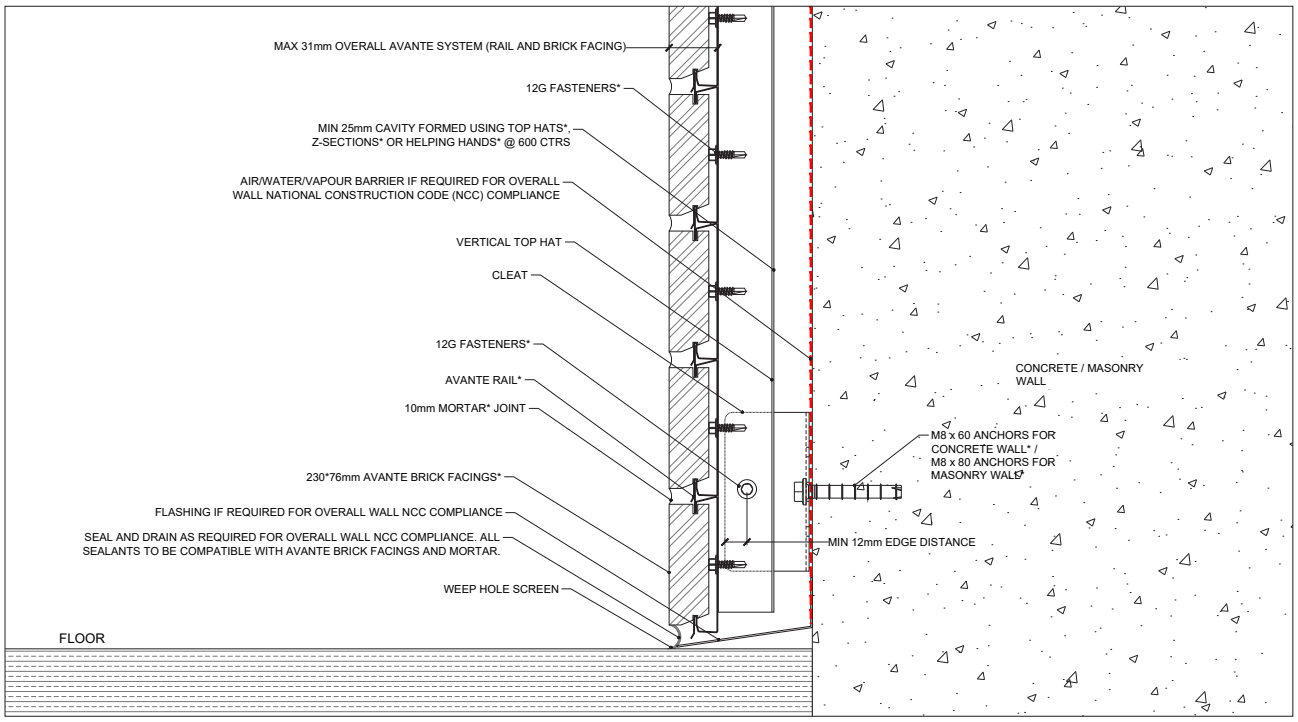


01 TYPICAL LIGHT GAUGE STUD FRAMING
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 TYPICAL CONCRETE WALL
SCALE N/A

Fig 10: Floor flashing detail



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

Fig 11: Typical capping detail

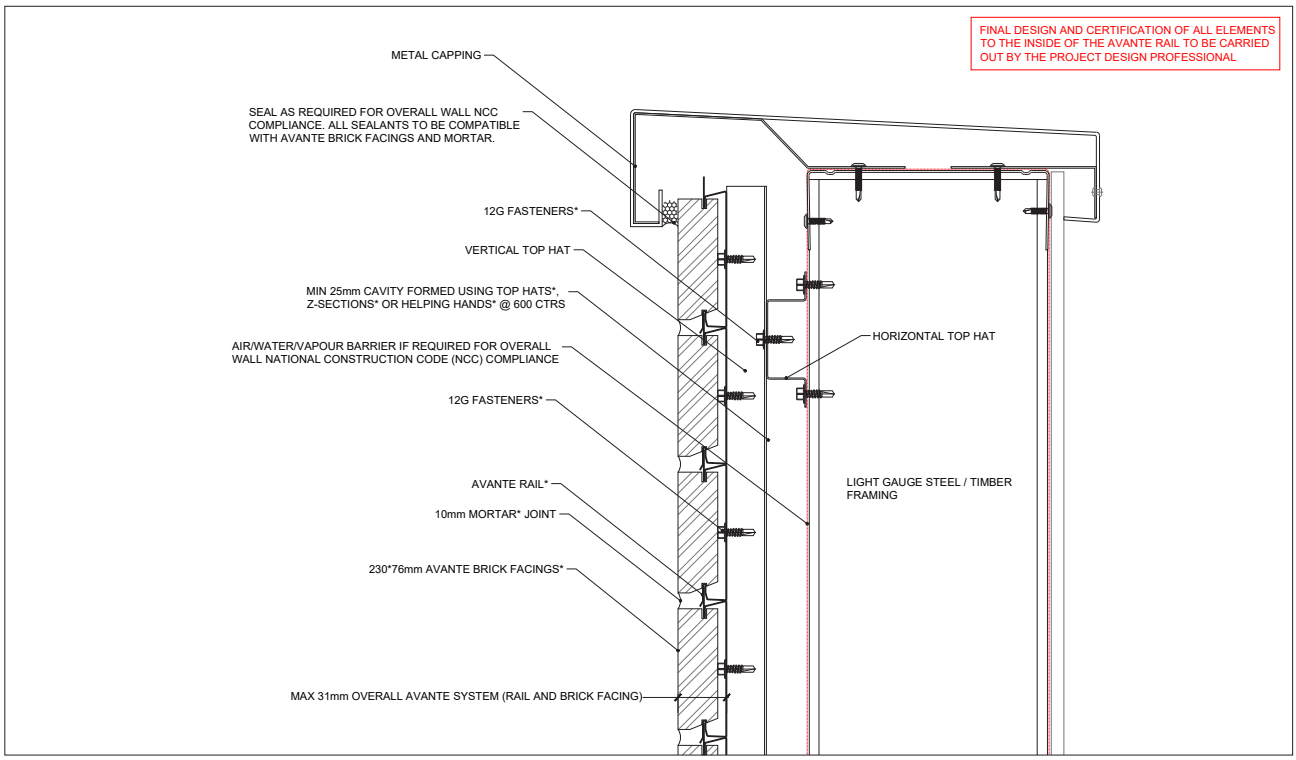
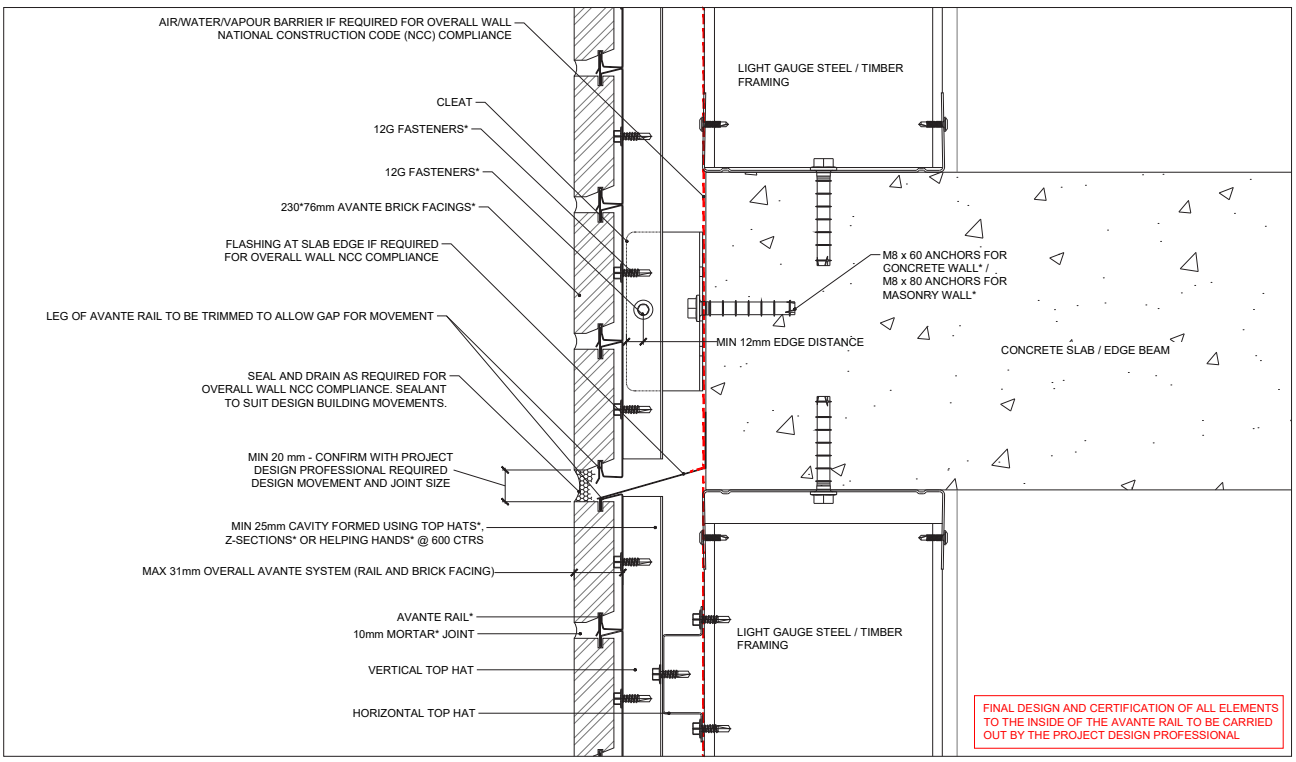


Fig 12: Horizontal control joint and slab edge flashing detail



04 SPECIFICATION DRAWINGS

Fig 13: Vertical expansion joint detail

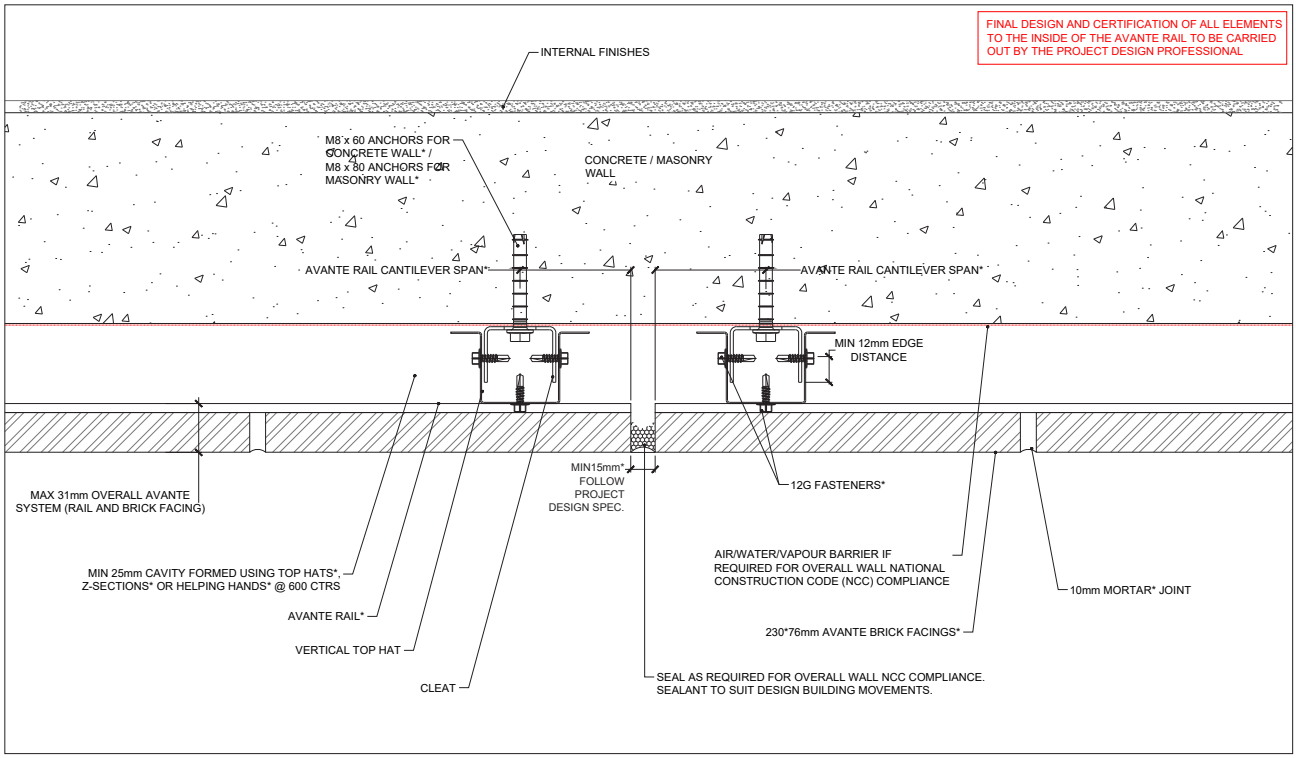
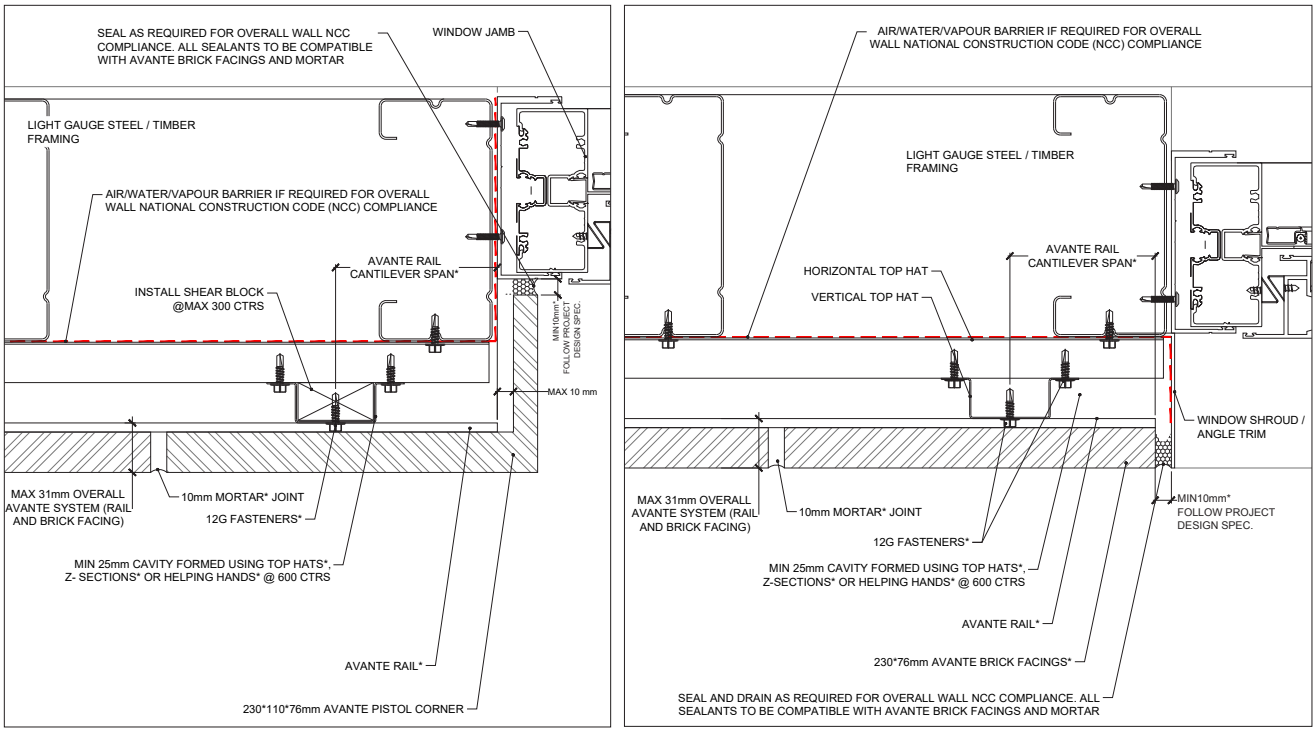


Fig 14: Window jamb details



01 WINDOW JAMB DETAIL - BRICK REVEAL
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 WINDOW JAMB DETAIL - METAL REVEAL
SCALE N/A

Fig 15: Door jamb details

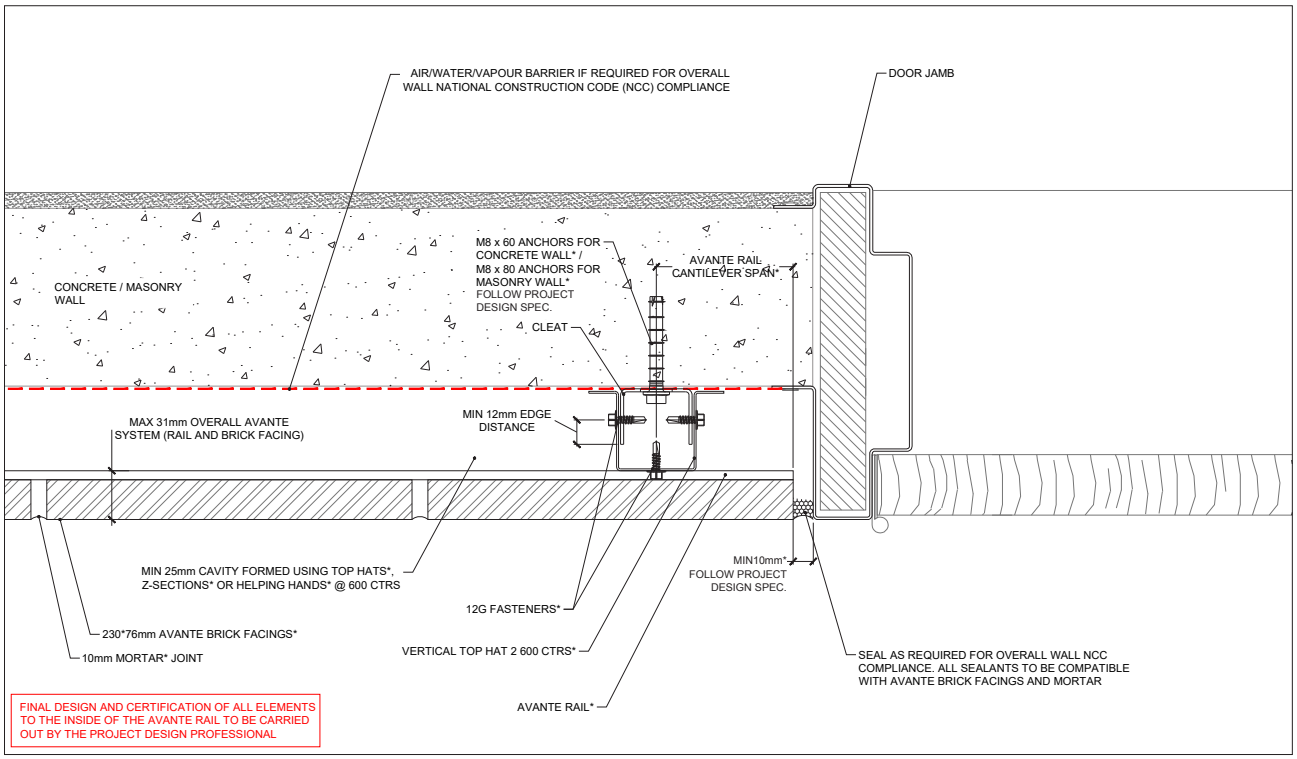
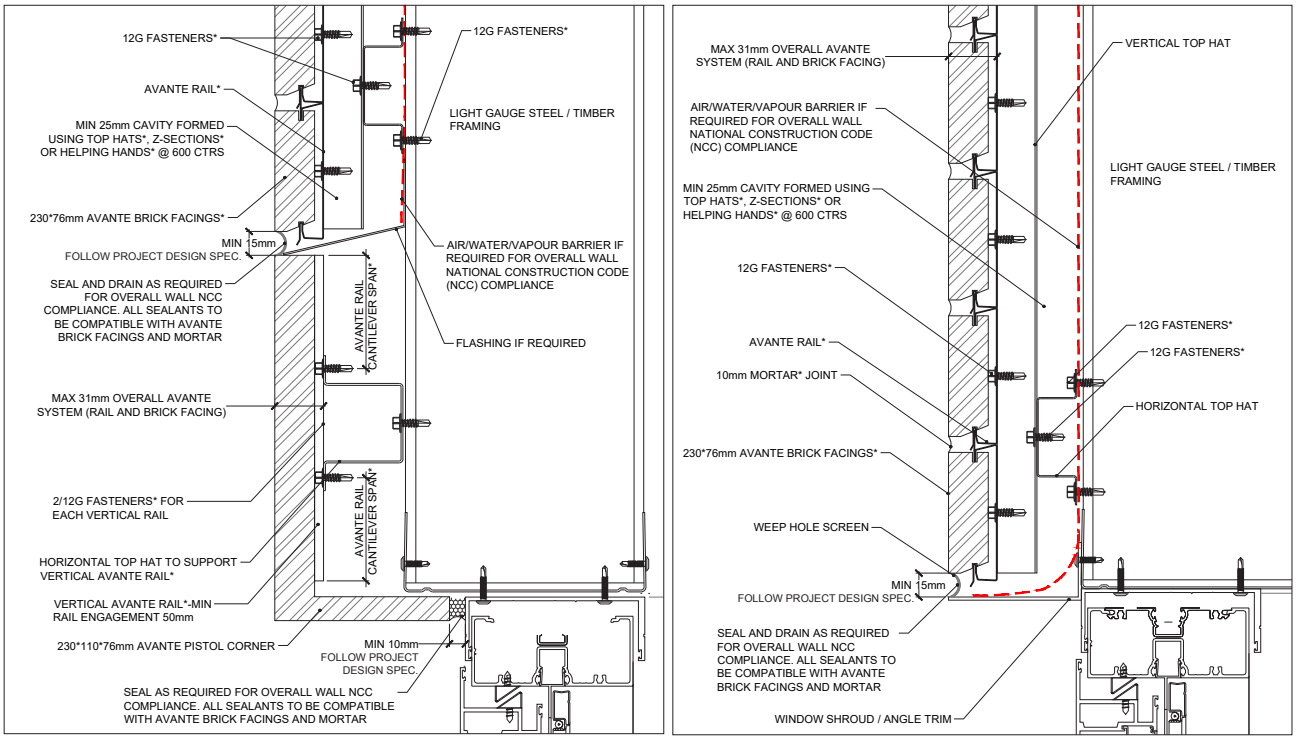


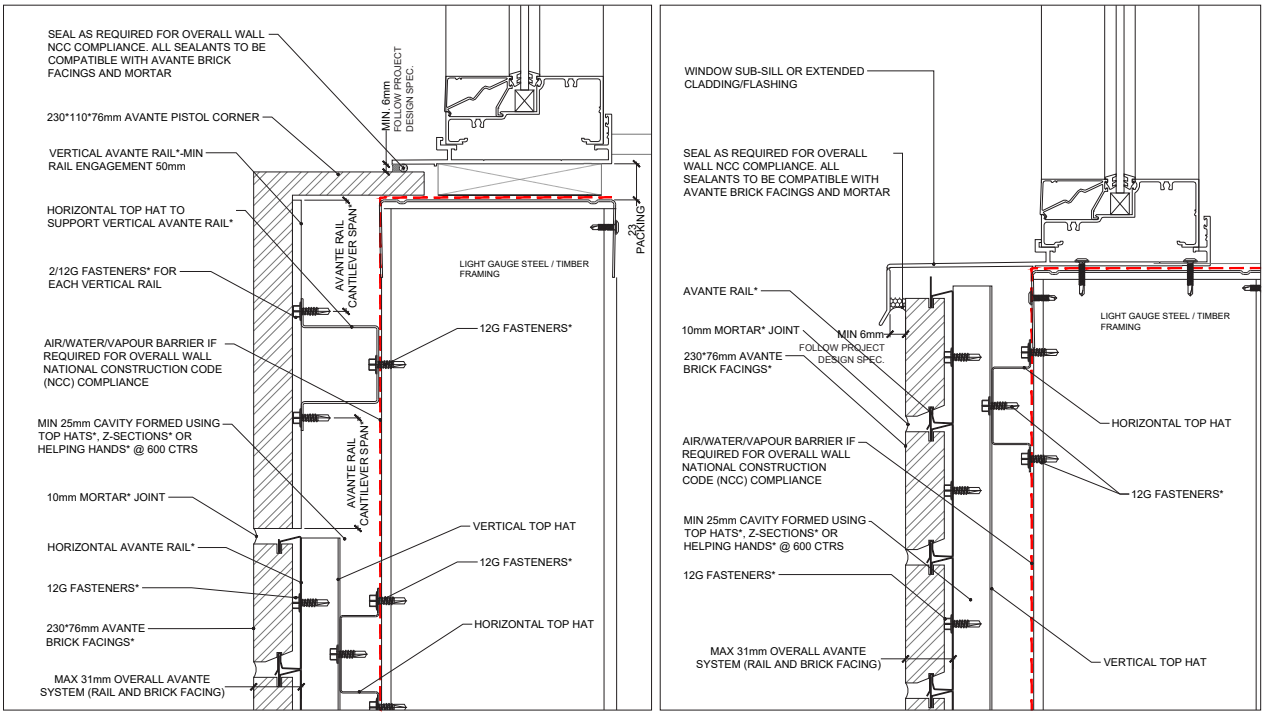
Fig 16: Typical Avante window head detail



04 SPECIFICATION DRAWINGS

Avante
A brick walling system

Fig 17: Typical Avante window sill detail

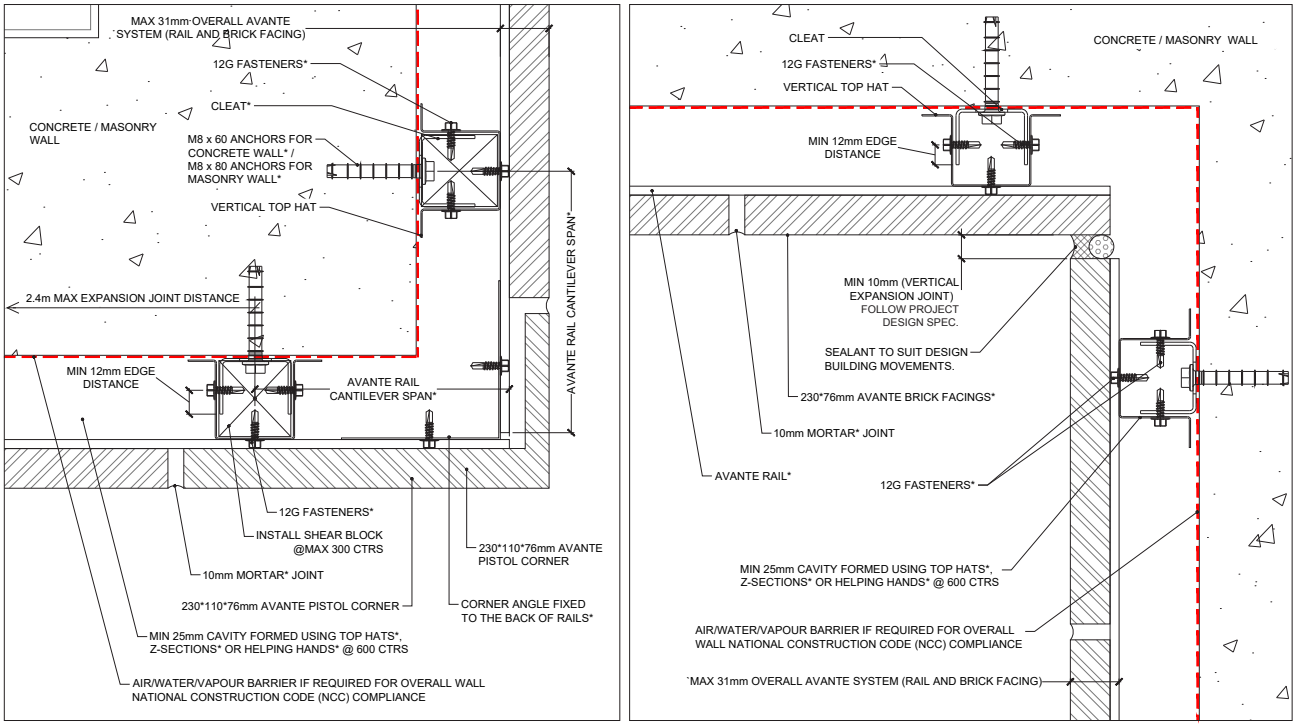


01 WINDOW SILL DETAIL - BRICK REVEAL
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 WINDOW SILL DETAIL - METAL REVEAL
SCALE N/A

Fig 18: Typical Avante corner detail



01 EXTERNAL CORNER DETAIL
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 INTERNAL CORNER DETAIL
SCALE N/A

Fig 19: Typical Avante detail abutting into soffit line

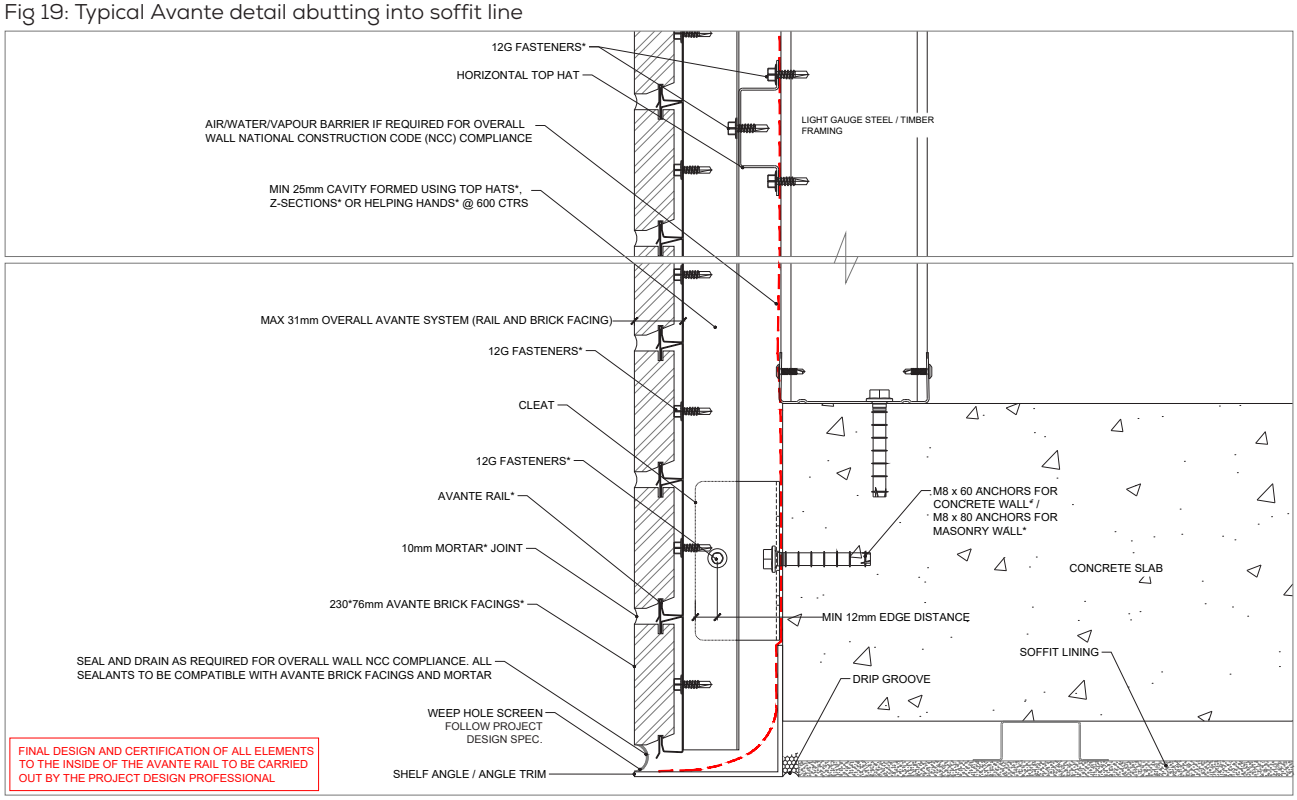
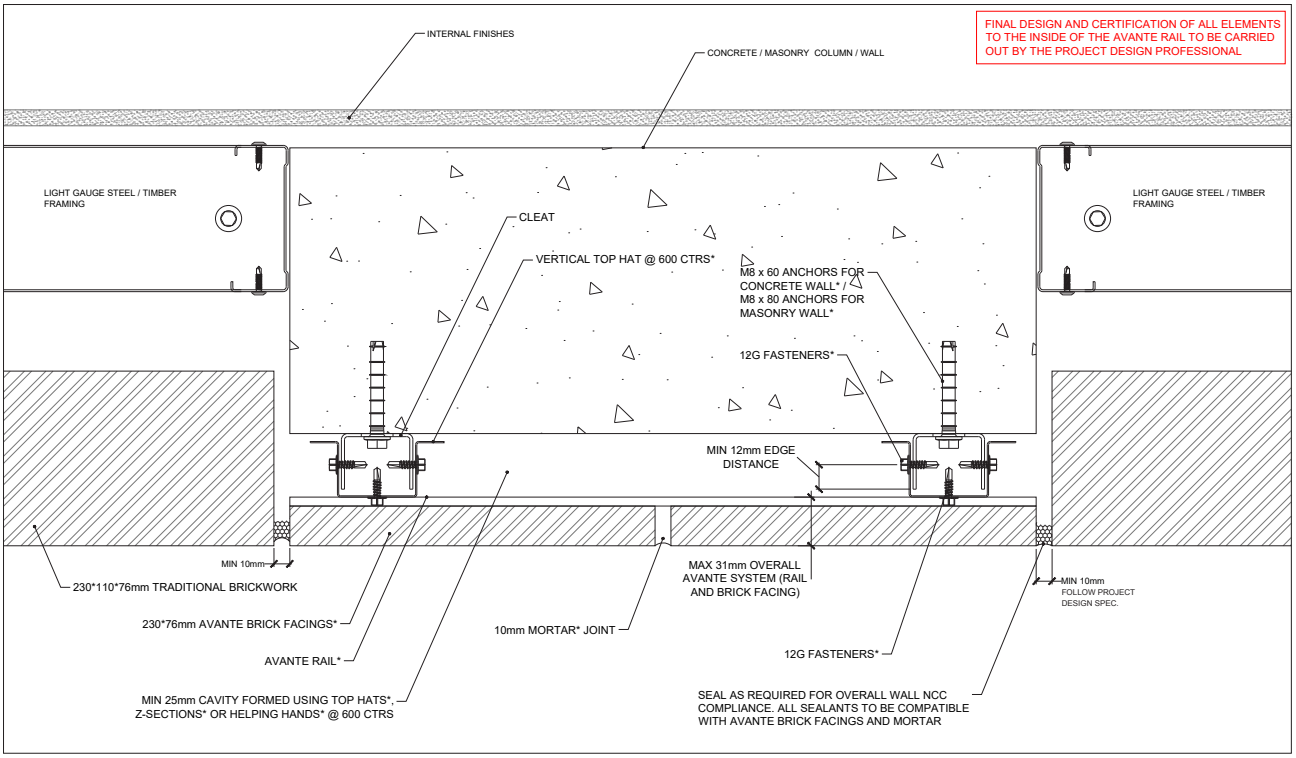


Fig 20: Typical Avante detail abutting into traditional brickwork



05 INSTALLATION

5.1 Job Safety

Local Work Health and Safety regulations appropriate to building construction (particularly handling and cutting of masonry and steel) must be adhered to when installing the Avante system.

Caution:

Product contains Crystalline Silica. Refer to Management of Silica Dust on site by Think Brick Australia.

5.2 Required tools

- Drop Saw – A good quality drop saw is required for cutting Avante steel rails.
- Jig Saw – A good quality jig saw with an 18-point metal cutting blade will be required to make any Avante steel rail horizontal or pattern cuts.
- Mitre Saw or Masonry Wet Saw – A mitre saw with a masonry blade or masonry wet saw may be used to cut Avante tiles and special shapes.

  Note
  A brick guillotine cutter may also be used. This is available from a masonry supply dealer or equipment rental centre. A brick guillotine cutter works well for Avante facing straight cuts.

- Screw Gun – Battery powered screw guns will be required to install Avante steel rail using Avante screw fasteners. Ensure drill bits are fitted with a torque head to prevent over/under tightening.
- Electric Drill and Mortar Paddles – To adequately mix the mortar
- Pointing Gun – We recommend using an Avante Mortar Pointing Gun for grouting your Avante project.
- Miscellaneous Hand Tools – Rubber Mallet, Hammer, Nail Punch, Tape Measure, long spirit level, Tin Snips, Utility Knife, Carpenter Pencil, Chalk Line, Caulk Gun, Slap Stapler, Mason's Pointing Trowel, Garden Trowel, Mason's Soft Bristle Brush.

5.3 Preparation

The supporting face/substrate to which the Avante system is to be fixed to should be flat, vertical and capable of supporting the identified loads.

Please consult with your project state's Guide to Standards and Tolerances Guide or the requirements of the National Construction Code (NCC):

- Timber framed housing should be designed and constructed in accordance with AS 1720 or AS 1684 (for residential builds).
- Steel framed housing should be designed and constructed in accordance with AS 4600 and/or the NASH Standard.
- Masonry substrates should be designed and constructed in accordance with AS 3700 or AS 4773 (for residential builds).
- Concrete substrates should be designed and constructed in accordance with AS 3600.
- Permanent formwork systems (such as CSR's AFS), and linings should be in accordance with the manufacturer's instructions.
- Rigid air barriers and pliable building membranes should be installed in accordance with AS 4200.2 and fitted over the substrate prior to the Avante system being installed.

Do not proceed with installing the Avante system until the substrate, windows, doors, and openings are covered fully with an appropriate air/water/vapour barrier in accordance with section 2.4.7. Flashings should comply with section 2.4.9 and 4.

5.4 Quality

Check to ensure that the brick facings supplied sufficiently match the dimensions as specified. Particular attention needs to be taken to ensuring the notch depth and width, and the thickness from notch to the rear of the facing is as required.

In transportation, breakage of brick facings may occur. This should be identified at the time of delivery of the product. Brick facings are defective if they are cracked or pitted at handover. Please replace defective brick tiles before commencing installation.

Install Avante brick facings in numbered sequence on pallets (i.e., install pallet 1, then install pallet 2 etc.)

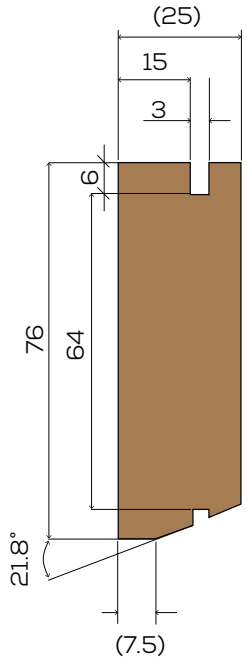


Fig 21: Avante facing side view

The tolerances applicable to conventional masonry under AS 3700 are detailed in the table below:

Item		Column 2 (Non-structural tolerance)
A	Horizontal position of any masonry element documented or shown in plan at its base or at each storey level	15mm
B	Relative displacement between loadbearing walls in adjacent stories intended to be in vertical alignment	10mm
C	Maximum deviation from plumb within a storey from a vertical line through the base of the member	10mm
D	Maximum deviation from plumb in total height of the building (from the base)	25mm
E	Maximum horizontal or vertical deviation of a surface from a plane surface (bow) in any 2m length	3mm
F	Deviation (step) of any exposed masonry surface from any adjacent exposed masonry surface. The bow provision of item E above also applies	2mm*
G	Deviation of bed joint from horizontal, or from the level documented or shown in elevation	10mm in any 10m length, 15mm in total
H	Deviation from documented thickness of bed joint	3mm
I	Minimum perpend thickness	5mm
J	Deviation from documented thickness of perpend	5mm
K	Maximum difference in perpend thickness in any wall	8mm
L	Deviation from documented width of cavity minimum width as required by the Building Code of Australia	15mm

Fig 22 Conventional masonry construction tolerances (AS3700 or Guide to Standards and Tolerances)

Note

- Bed and perpend joints are to be 10mm subject to the tolerance detailed above.
- Certain product ranges have intentionally erratic surface deviation and may make it difficult to comply with item F above. It is the responsibility of the installer to ensure that facings are installed in a coordinated manner such that adjacent units do not deviate to much from one another, and don't compromise the aesthetic of the wall.

* The tolerances allowable for Avante units differ to conventional masonry units, meaning that tolerance F may differ from the above.

5.5 Vertical Supports

The Avante system is fixed to vertical supports (steel top hats, top-hats and cleats or helping hand brackets) which are required to be spaced in accordance with section 3.1.1.2.

Vertical lengths and allowable vertical spans of these vertical supports are subject to the manufacturer's instructions.

The vertical supports must allow for a cavity (between substrate and the Avante system) of at least 25mm.

These supports are firstly fixed vertically onto the substrate (over the top of the pliable building membrane) at 600mm spacings, except where limited by 3.1.1.2.

The manufacturer of the vertical supports and fasteners should be consulted for selection of parts and correct install.

Note: From the back of the rail to the face of the brick is approx. 30mm. This needs to be considered when maintaining a cavity depth to ensure the surface interfaces level with other surfaces in the build.

5.6 Flashings

Flashings should be installed to control moisture.

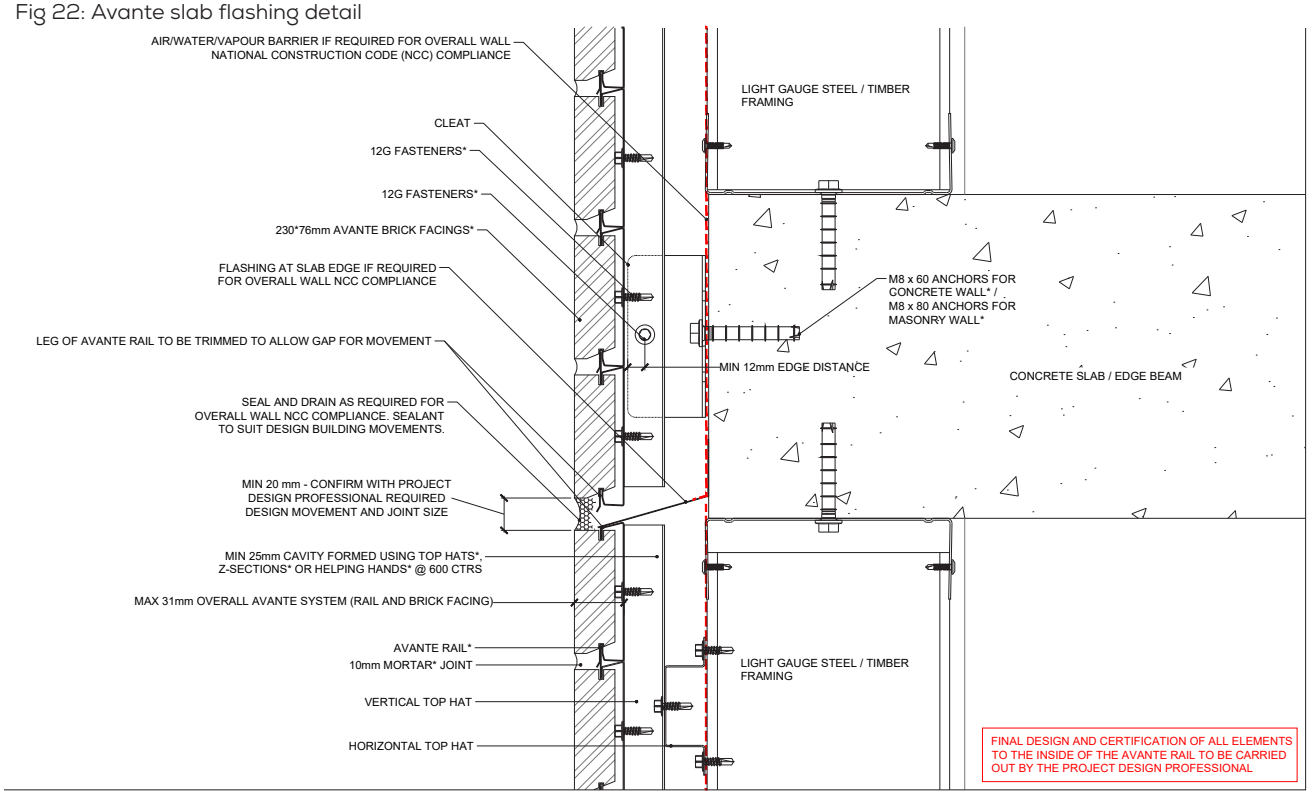
Flashings should be located at the panels base, all floor edges and at all points where the cavity is interrupted by an element i.e. windows and doors.

Fix the base flashing to the substrate (over the pliable building membrane) a minimum of 150mm from the footing, and at maximum 600 centres along the substrate.

Corners and joints should be lapped by a minimum 150mm.

Please refer to section 4 for detailed drawings.

Fig 22: Avante slab flashing detail



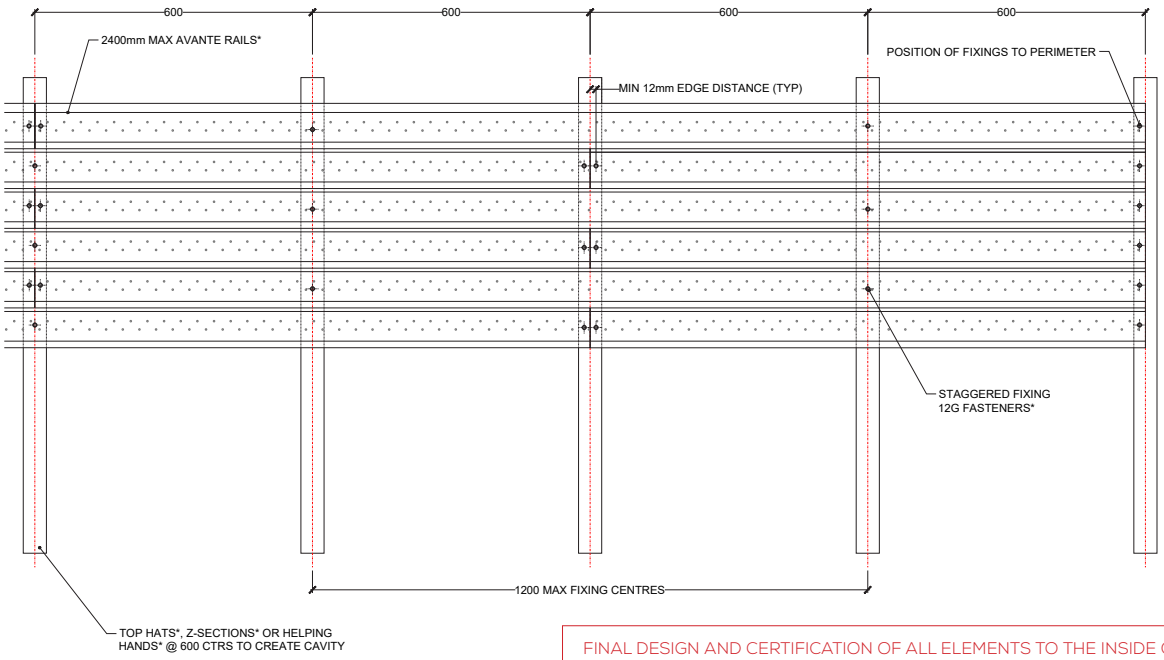
5.7 Rail set out

The Avante rails are installed from the bottom working up a wall.

The Avante rails are generally supplied in 2400mm m lengths and are butt jointed over the vertical supports using an appropriate fastener (see section 2.4.8 in conjunction with section 3.3)

The joint between rails should occur at a vertical support and joints between adjacent courses should be staggered as per figure 23 below.

Fig 23: Fixing pattern



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

When required, lengths of rail can be cut to size using the required tools. Do not use methods which may generate high temperatures such as abrasive disc cutters as this damages the rails galvanized coating.

Note: the set out of the course rail is 86-87mm gauge.

Once a starting datum point has been determined, the rails are to be installed level and to align at each corner. The datum point should be chosen on the basis that it allows you to easily refer back to it to keep the rails level and to do uninterrupted runs of rail easily.

Analyse all openings to choose a starting point that will minimise course adjustments. Proceed to fix the rail to the vertical supports.

Ensure all rails are being clipped together using the interlock action. Ensure that the rails are properly interlocked to ensure that the resulting bed joint is 10mm +/- 3mm.

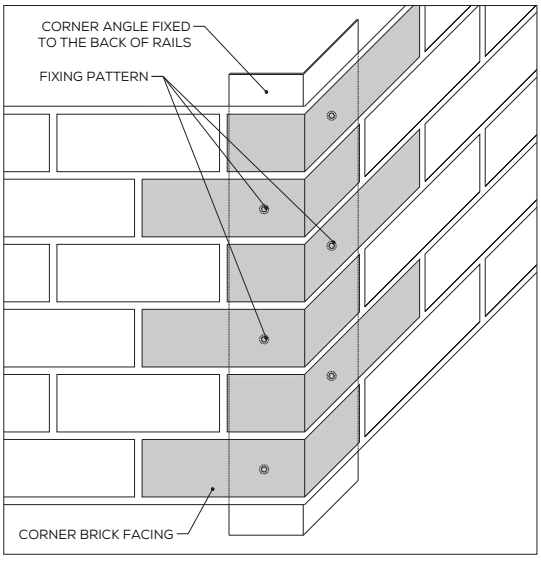
At corners, the rails are butt jointed over a corner angle (see section 2.4.9 in conjunction with section 3.3) which supports the rail. Please see figure 24 below, figure 26 and section 4 for more details.

If rail is found damaged or deformed, please do not use it for installation. Contact PGH immediately to discuss further.

Fig 24: Corner angle detail

*NOTES:

1. SEE SECTION 3.3 FOR MATERIAL SELECTION FOR CORROSIVITY ENVIRONMENT.
2. SEE TABLE 3 & 4 (CANTILEVER SPAN TABLE) FOR MORE INFORMATION ABOUT AVANTE RAIL CANTILEVER SPAN REQUIREMENTS.
3. SEE BELOW FOR CORNER ANGLE FIXING PATTERN



01 CORNER ANGLE FIXING PATTERN
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

5.8 Brick Facings

Brick facings size and shape tolerances are checked by the manufacturer, however the installer should double check each consignment prior to installation, to ensure no defected facings are installed.

The most important aspect of the tile is to ensure that the notch depth, notch width, and thickness of material from notch to the back of the tile, is as specified.

Plain facings should be taken from a minimum of three packs simultaneously to ensure good color blending.

When required to cut a tile to a required length or special shape, a wet diamond-tipped masonry saw should be used and appropriate PPE worn. Please consult with PGH Bricks before doing so.

Check on Delivery

In transportation, breakage of brick tiles may happen. This should be identified at delivery of products. Brick tiles are defective if they are cracked or pitted at handover. Please replace defective brick tiles before any installation works. The most important aspect of the tile is to ensure that the notch depth, notch width, and thickness of material from notch to the back of the tile, is as specified.

Avante brick tile units are cut in different batches which comes with similar colour, dimension in one pallet. To mitigate variation among a wall, PGH recommends not mixing batches and draw brick tiles from the same pallet where possible during the process of laying.

5.9 Fitting

Prior to installation of the facings, the rails should be cleaned to remove any debris and moisture, and individual facings should be checked in accordance with 5.4 prior to permitting their install.

Facings are simply inserted into the steel rail with the top of the facing first, feeding the facings top notch into the up most rail section, and resting the lower chamfered facings edge on the lower rail section. Facings should never be knocked into the rail since this may damage the unit notch and compromise the engagement capacity between brick unit and rail. Using a rubber mallet, apply a slight cushioned blow to the facings bottom, allowing the chamfered edge to slide into the rail and the facings notch to engage in the rail.

Fig 25: Avante facing secured in rail

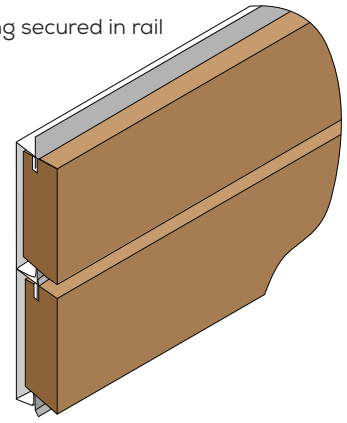
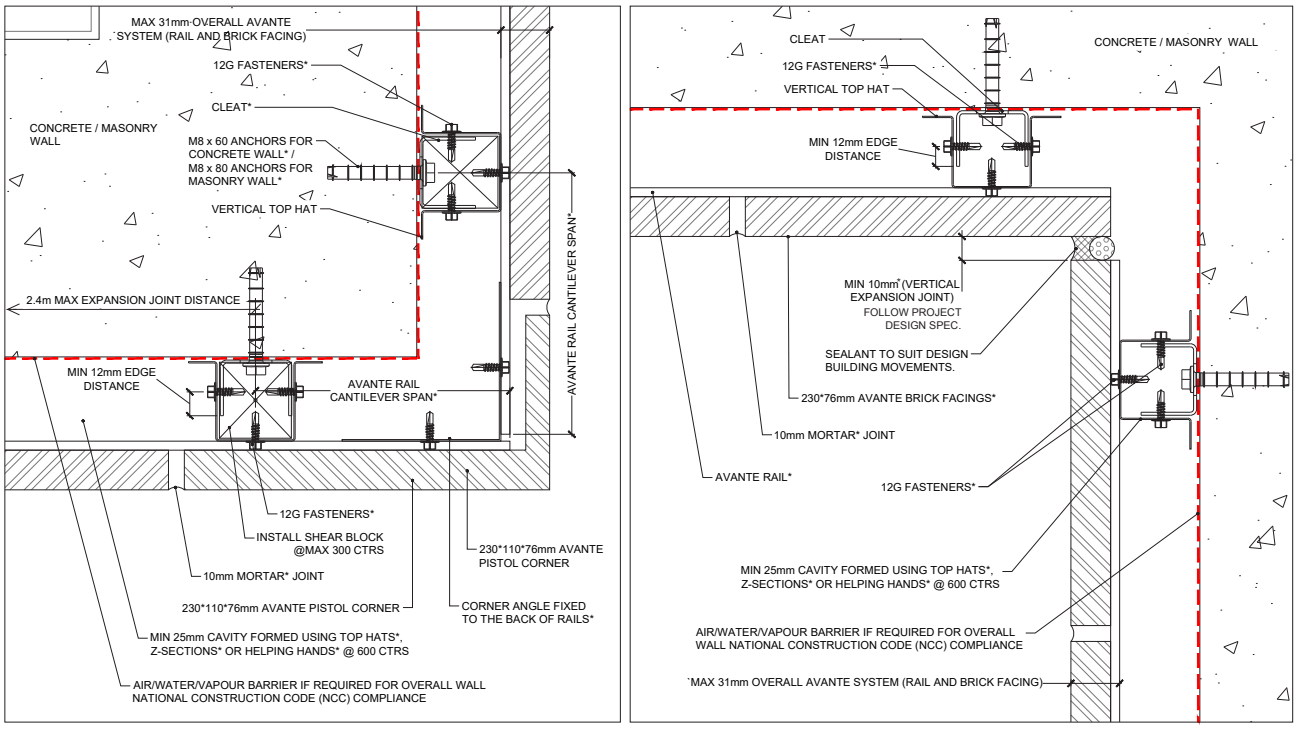


Fig 26: Avante Corner detail for concrete/masonry substrate. The detail for steel/timber framed substrate will be identical except that the vertical supports must be in accordance with 2.4.5.



01 EXTERNAL CORNER DETAIL SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 INTERNAL CORNER DETAIL SCALE N/A

Once facings are secured in the rail, they can be shifted into their final place using a rubber mallet or timber offcut. Care must be taken to minimise the risk of abrasion to the rails and facing. The position of facings should be set out from the corners, inwards on each elevation, adjusting the vertical joint width to suit variations in facing lengths – min joint width 7 mm, max 13 mm.

For external corners, the pistol facing simply slides into the rail, it should not be knocked into place. For internal corners, traditional facings should be used and on alternate courses, cut to size to represent a return header, and to achieve the appearance of traditional brickwork. A gap (later to be sealed) should be left at the corner as a movement joint. See figure 26 below.

5.10 Mortar

The mortar is applied using manual, mechanical or compressed air-based pumps with controlled nozzle applicators.

Mortar selection should be in accordance with section 2.4.2.

It is recommended to use the below ratio when mixing mortar - please refer to the project specification for which to follow:

- M3 (1:5 with a methyl cellulose water thickener), as per AS 3700.
- M4 (1:4 with a methyl cellulose water thickener), as per AS 3700.

When mixing the constituents, gradually add water while mixing with a slow speed drill and blender until a consistency similar to stiff cream is achieved. After mixing, allow the mortar to stand for approximately 5 minutes and briefly remix. Consistency can be checked by filling a tube. The mortar should not run out but should fall out in “drops” when the tube is shaken.

Fill the mortar pointing gun to within 20 mm of the top and shake to dispel air pockets. Full tubes may be stored upright in a bucket with 20 mm of water in the bottom to prevent the mortar in the nozzle from stiffening. In hot weather the bucket and tubes should be covered.

The gun works by fingertip pressure on the trigger. If greater pressure is needed then probably either the gun is blocked or the washer is too tight and needs adjusting or cleaning.

Surfaces to be pointed should be clean and dry.

Work should not commence at temperatures below 5 °C. Setting time will be directly affected by temperature.

Pointing should commence at the highest part of one end of the wall and proceed in horizontal bands downwards.

The horizontal bands should be completed in areas approximating to the extent of the joint that can be filled with one tube. The depth of the horizontal band should relate to comfortable working heights and convenient scaffolding lifts, say about 1 m.

Start each area by filling vertical joints from the lowest course to the highest. Fill each joint from the bottom of the joint to the top. When the joint is full, tilt the barrel of the gun down below the nozzle and 'cut' the mortar from the nozzle on the underside of the brick above.

Fill the bed joints by drawing the gun along the joint. The gun should be kept at a constant angle to the joint to promote an even fill. The trigger should be squeezed with confidence so that mortar is injected to the back of the joint and slightly overfilled rather than under filled.

Attention should be made to complete and continuous filling of the joints at corners so that weak points and cracks are avoided. It is recommended that the joint is filled by running the nozzle around the corner rather than up to and away from the corner at each side.

The mortar joint should be tooled to ensure an ironed or weather-struck joint. Flush joints can be achieved, provided the pointing is compacted to ensure engagement in the system and sealing of the edges. Raked joints should not be used with the Avante system.

Curing time for mortar to reach adequate strength is nominally 7 days.

5.11 Holes/Penetrations

Holes made in the brick facings which are less than 12 mm diameter should be formed with a masonry bit and hammer action drill. It is recommended that the hole be centered on the horizontal center line of the facing. After penetrating the tile, the steel backing section can be cut with a conventional high-speed drill. Seal around the penetration, rail and tile with polyurethane foam or an alternate suitable sealant.

Holes larger than 12 mm should be formed by first removing tiles in the area of the hole and cutting through the steel with a conventional hole saw. It is recommended that a 20 mm deep piece of plywood or timber is screw-fixed to the face of the steel to facilitate centring of the drill. Facings should then be pieced around the penetration after sealing with polyurethane foam or an alternate suitable sealant.

Care should be taken to ensure the building structure, or services within the structure, are not damaged when drilling such holes.

Care should be taken to ensure the building structure or services within the structure are not damaged in drilling such holes.

When wanting to attach items to the external wall (such as power boxes, signs, etc...), these items should be appropriately fixed to the substrate, such that no dead load is carried by the Avante system or the Avante system's vertical supports. Consider installing horizontal noggins in steel or timber framed substrates to align and accommodate the fixing of the attachment. When the item is to be recessed into the cavity, the opening should be treated like a window and be appropriately flashed and sealed. When the item is to sit on the surface of the Avante system, penetrations will need to be made and appropriate supports (such as noggins in steel/timber framing, and additional top-hats capable of carrying the load of the item) fixed to the substrate to accommodate fixing the item just proud of the Avante system. Seal around the penetration with a suitable sealant. To ensure unity of brick courses and look, facings can continue behind the item and abut the penetration.

For other situations, please contact PGH.

5.12 Openings (doors, windows, etc...)

All windows, doors and openings should be flashed off fully over the top, both sides and the bottom with flashing material compliant with section 2.4.10 to ensure no water can penetrate.

The control joint to accommodate movements around openings should follow the project design specifications.

Rails should be installed as per section 5.7. Facings should be butt jointed up against the architrave of the opening. If required, facings should be cut in accordance with section 5.8.

For headers and sills, stretcher bond is easily achieved provided the set out has been done with this intention.

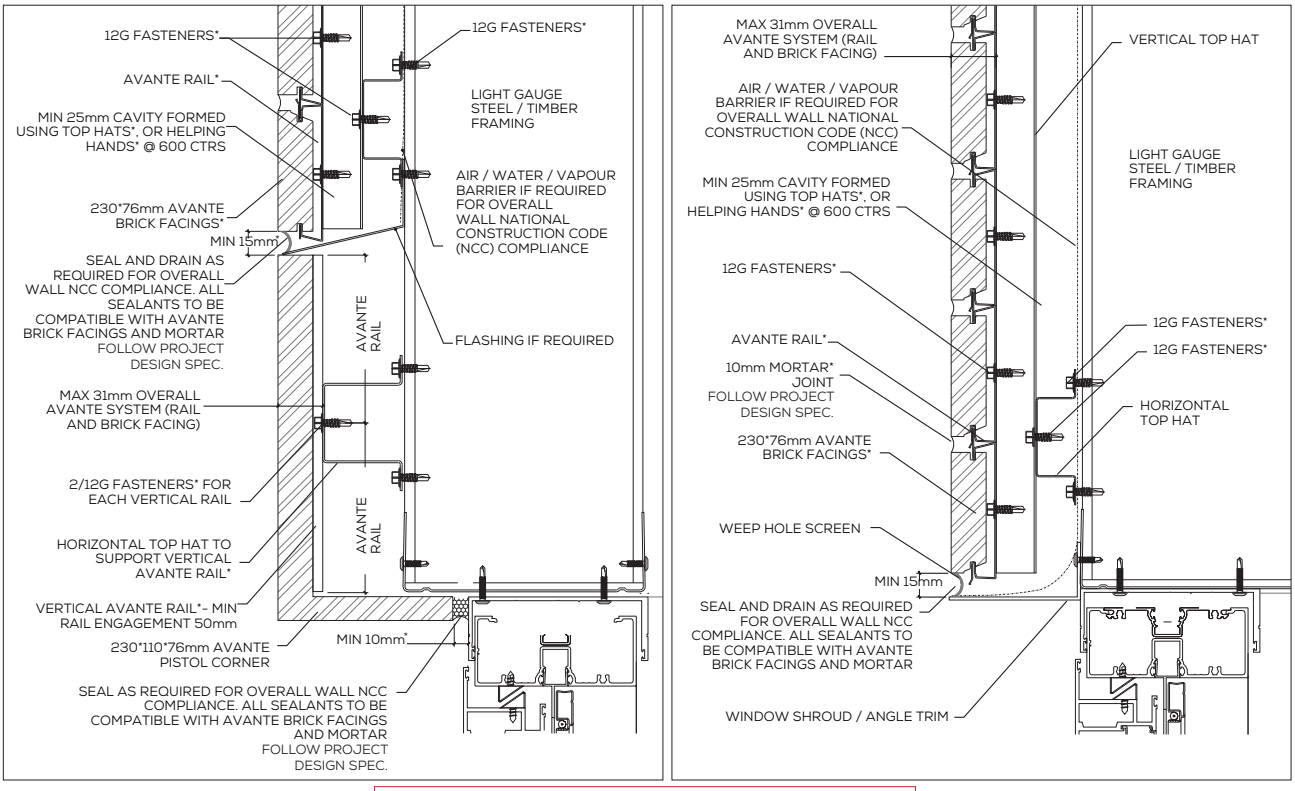
At sill junctions, a windowsill flashing should extend over the top course of the Avante system, to prevent excessive water getting in behind.

At header junctions, an angle trim should be fixed to the substrate, and placed on top of the window/door. The Avante system should abut down to this trim, with the bottom junction sealed with a sealant.

The gap created by abutting the Avante system with openings should be sealed in accordance with 2.4.3.

Please refer to figure 27-30 below and section 4 for detailed drawings.

Fig 27: Avante window head detail. The detail for concrete/masonry substrates will be identical except that the vertical supports must be in accordance with 2.4.5.

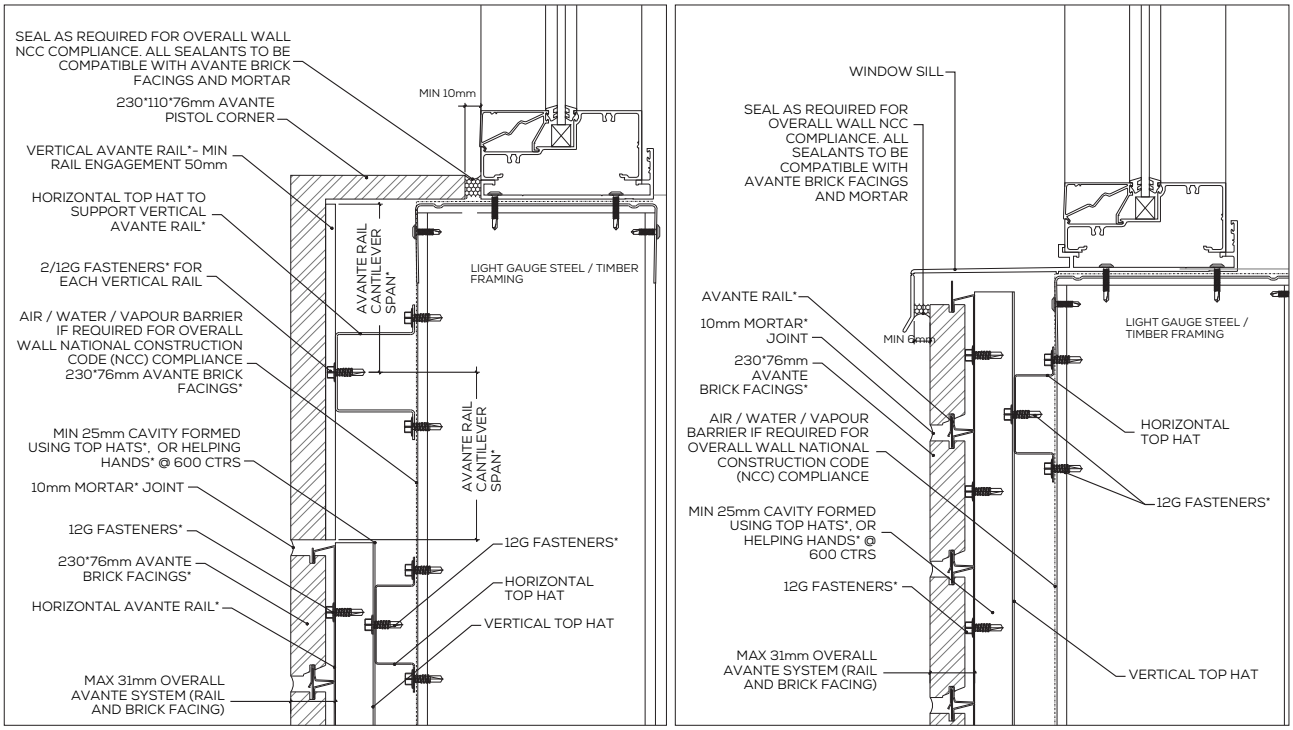


01 WINDOW HEAD DETAIL - BRICK REVEAL
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 WINDOW HEAD DETAIL - METAL REVEAL
SCALE N/A

Fig 28: Avante window sill detail. The detail for concrete/masonry substrates will be identical except that the vertical supports must be in accordance with 2.4.5.

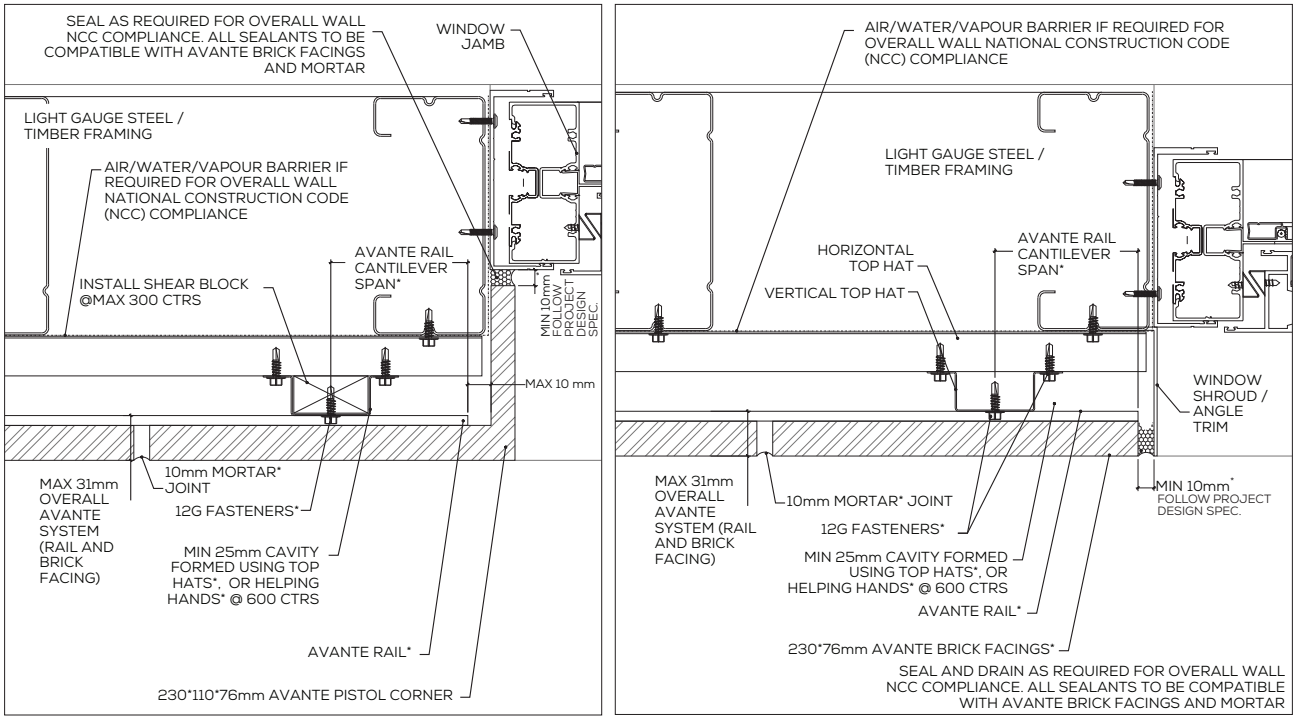


01 WINDOW SILL DETAIL - BRICK REVEAL
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 WINDOW SILL DETAIL - METAL REVEAL
SCALE N/A

Fig 29: Avante window jam detail. The detail for concrete/masonry substrates will be identical except that the vertical supports must be in accordance with 2.4.5.

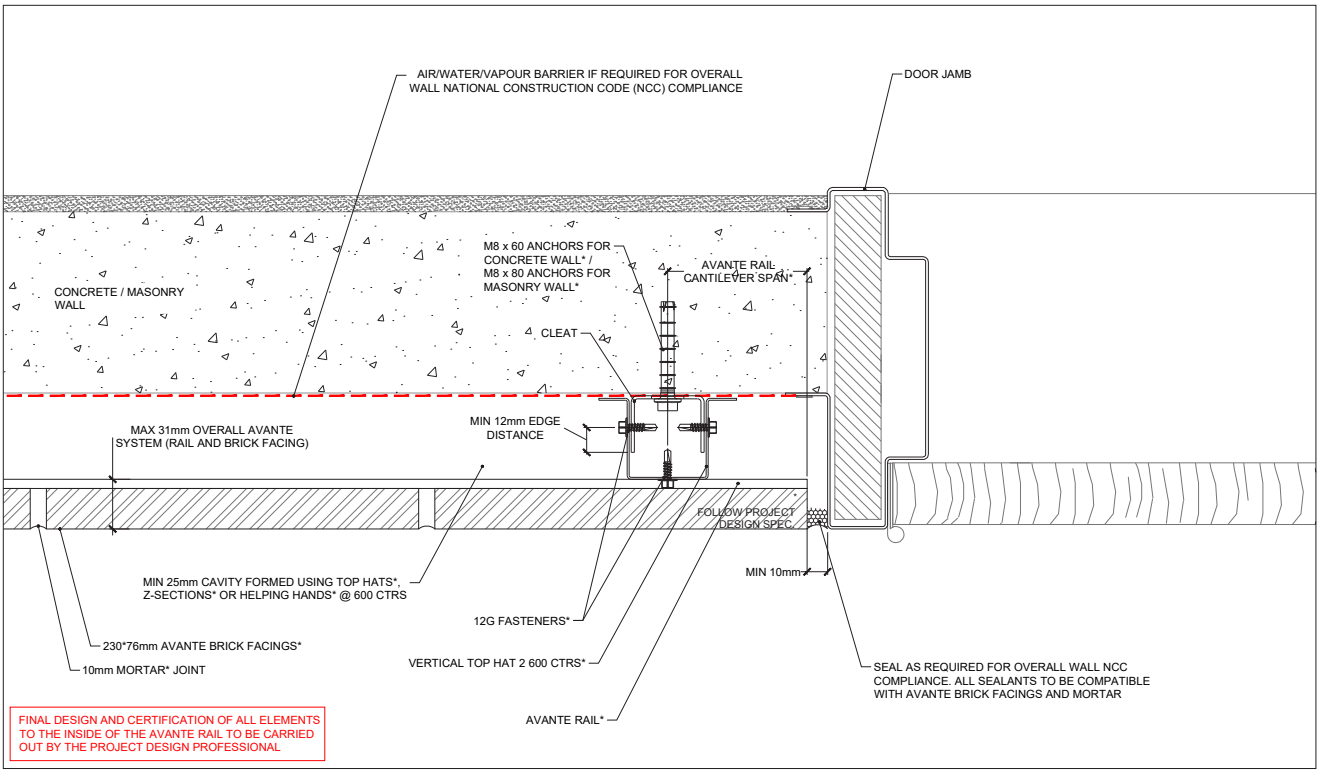


01 WINDOW JAMB DETAIL - BRICK REVEAL
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE AVANTE RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

02 WINDOW JAMB DETAIL - METAL REVEAL
SCALE N/A

Fig 30: Avante door jam detail. The detail for concrete/masonry substrates will be identical except that the vertical supports must be in accordance with 2.4.5.



* The project engineer must confirm that this nominal joint size is sufficient to accommodate expected building movements, thermal expansion/contraction of materials, and any other project-specific movements. Similarly, joint sealants shall have sufficient movement capacity to also accommodate these movements.

5.13 Movement Joints

Movement joints in the Avante system should be in accordance with section 2.4.3 and placed in accordance with 3.2. However, provision for movement is the responsibility of the building design professional and must be confirmed before proceeding with installation.

Vertical movement joints must extend the full height of a continuous Avante section. Vertical movement joints are formed by separating horizontally abutting sections of rail, leaving a gap equivalent to the required movement joint width. Consideration must be made to ensure that the cantilevered span of rail (from the vertical support to the movement joint) is in accordance with 3.1.1.2.

Horizontal movement joints are created by separating vertically engaging sections of rail, leaving a gap equivalent to the required movement joint width.

Supports must discontinue at horizontal control joints. For horizontal control joints located at slab edges:

- Supports located above the control joint must be connected to the slab edge and/or substrate the floor level/above. See figure 14.
- Supports located below the control joint must be connected to the substrate the floor below. See figure 14. Proceeding installation of the Avante system for the section, the gap is then sealed with a proprietary sealant that is chemically compatible with the system (including non-staining), and accompanied with a backing rod as per the sealant manufacturer's instructions.

5.14 Cleaning

Efflorescence from the mortar may occur as is normal with all cementitious materials during early life. Any such efflorescence should be allowed to naturally dissipate or can be scrubbed off with a thick bristled brush if desired.

Cleaning should not proceed until the mortar has hardened, which is at least 3 days after the mortar has been applied.

All mortar debris should be removed with hand tools before applying water to the brickwork.

It is essential to pre-wet any areas to be cleaned with potable water to prevent absorption of the cleaning agent into the mortar or tiles. Pre-wetting limits the cleaning action to the surface where it is required.

Wash the wall with high pressure water from top to bottom so all dissolved mortar particles will be completely flushed from wall surfaces. The maximum pressure at the pump should be kept low, below 7,000 kPa (1,000 psi), to prevent damage to either the masonry facings or the mortar. A straight or zero degree water jet should never be used. A spray angle of 15 degrees, called a fan jet, will allow the operator to concentrate the pressure on the brick facings and not on the joint. The jet should generally be 500mm from the wall and never closer than 300mm for localised patches. Any remaining particles should be scrubbed off using a thick bristled brush.

Any cleaning must only be done with non-acid based cleaners.

Turbo head water jets are not recommended for use on the Avante system.

For more information on cleaning the Avante system, please contact PGH.

06 MAINTENANCE

Regular yearly inspections must be made of the condition of the cladding to ensure the integrity and adequacy of the weather resistance.

Inspections are to look for visible signs of problems such as cracking of the brick facing and mortar joints, or rust staining. Minor damage may require mortar and tile removal and replacement in a limited area only. More serious damage may involve tile and mortar removal, along with brick slip and support structure replacement. Cracks in the mortar joints are to be repaired to maintain the weather resistance and prevent water from entering behind the brick facing and impacting the channels.

The durability options assume the external face of the system is maintained and cleaned with potable water at regular intervals. Where the project is located in corrosivity category C1/C2 this process is to be undertaken every 12 months. Where the project is located in corrosivity C3 and C4, this process is to be undertaken on a 6 monthly basis and for C5 on a 3 monthly basis.

If signs of problems are identified during the regular inspection regime, notify PGH Bricks and Pavers in writing for further advice. Signs of problems may require the interval between inspections to be reduced.

07 CASE STUDY

Façade System Helps Gym Achieve New Look

A popular gym uses the Avante brick facade system over existing internal walls to achieve an impressive brick finish.

Having outgrown the premises of his successful Jindalee Fitness 24/7 gym business, Doug Curtis seized the opportunity to create a fresh new interior design style for his gym. As part of the refresh, Doug wanted to incorporate brick on selected walls in the building.

Overcoming site challenges

Achieving a brick finish posed challenges as there was an existing concrete block wall coupled with a timber stud wall above it, both of which were clad in plasterboard.

To overcome this design challenge, Doug selected 82m2 of PGH's Avante Brick Façade System. The Avante system was key to successfully delivering the project. It enabled Doug to achieve the brick look without having to demolish the existing walls to build a conventional brick wall.

"Avante is a quality product, with a finish of full brick and weight savings."

Chelsea, from the PGH Manhattan range, was chosen for use in the Avante system as it provides an authentically industrial look. Using Chelsea enabled Doug to create the rustic, yet comforting, look that is desired in modern gyms.

"Avante is a quality product, with a finish of full brick and weight savings, which suited the application we wanted," said Doug.

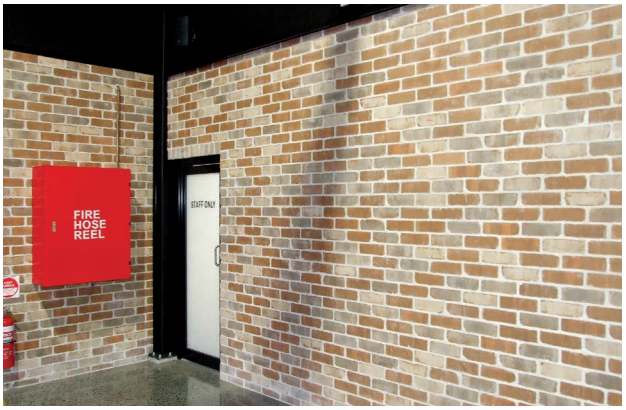
Avante delivers a genuine brick finish with ease

The innovative Avante brick facade rail system also delivered a genuine brick finish over both the existing stud and concrete block walls as well as in other areas including corners and doorways.

The result was met with high praise from the client. "It sets the club off nicely," says Doug. "I've had a lot of positive comments and it is a real feature."

The installation was managed by Mark Smith of JAMAR Constructions. Mark noted that the installation was "easy". He was pleased with how well the Avante brick facade system worked over the existing wall.

The Avante brick walling system from PGH Bricks & Pavers offers a new way forward for lightweight walling solutions where brick is preferred. Find out more now.



PGH BRICKS & PAVERS™

For more information contact

pghbricks.com.au/avante | **brickfacadesystems@csr.com.au**

1300 313 382

Avante
A brick walling system

@pghbricks

* Images used show the possibilities of using Avante in the design and construction of buildings and are not actual buildings built using the Avante system.